



## ecology and environment, inc.

International Specialists in the Environment

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September 9, 2009

Brandon Perkins, Task Monitor  
United States Environmental Protection Agency  
1200 Sixth Avenue, Mail Stop ECL-112  
Seattle, Washington 98101

**Re: Contract Number: EP-S7-06-02**  
**Technical Direction Document Number: 08-02-0017**  
***Final Tuluksak River Site Inspection Report***

Dear Mr. Perkins:

Enclosed please find the Final Site Inspection report for the Tuluksak River site, which is located near Tuluksak, Alaska. This version incorporates EPA comments. If you have any questions regarding this submittal, please call me at (206) 624-9537.

Sincerely,  
ECOLOGY AND ENVIRONMENT, INC.

Linda Costello  
START-3 Project Leader

cc: Mark Woodke, Project Manager, E & E, Seattle, Washington

# **Final Tuluksak River Site Inspection Report**

**Tuluksak, Alaska**

**Technical Direction Document Number: 08-02-0017**

**September 2009**

**Prepared for:**

**UNITED STATES ENVIRONMENTAL PROTECTION AGENCY**

1200 Sixth Avenue, Mail Stop ECL-112  
Seattle, Washington 98101

**Prepared by:**

**ECOLOGY AND ENVIRONMENT, INC.**

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## List of Abbreviations and Acronyms

BGS	below ground surface
CFS	cubic feet per second
CLP	Contract Laboratory Program
CRQL	contract-required quantitation limit
DQOs	Data Quality Objectives
E & E	Ecology and Environment, Inc.
EPA	United States Environmental Protection Agency
GPS	Global Positioning System
IDW	investigation-derived waste
MS	matrix spike
%R	percent recovery
PA	preliminary assessment
PPE	probable point of entry
QA	Quality Assurance
QC	Quality Control
RPD	relative percent difference
SI	Site Inspection
SQAP	Sampling and Quality Assurance Plan
START	Superfund Technical Assessment and Response Team
TAL	target analyte list
TDL	target distance limit
TM	Task Monitor
Tuluksak River	Tuluksak River

# 1

## Introduction

Ecology and Environment, Inc., (E & E) was tasked by the United States Environmental Protection Agency (EPA) to provide technical support for completion of a Site Inspection (SI) at the Tuluksak River (Tuluksak River) site near Tuluksak, Alaska. E & E completed SI activities under Technical Direction Document Number 08-02-0017, issued under EPA, Region 10, Superfund Technical Assessment and Response Team (START)-3 contract number EP-S7-06-02.

The specific goals for the Tuluksak River SI, identified by the EPA, are:

- Determine the potential threat to public health or the environment posed by the site,
- Determine the potential for a release of hazardous constituents into the environment, and
- Determine the potential for placement of the site on the National Priorities List.

Completion of the SI included reviewing existing site information, determining regional characteristics, collecting receptor information within the range of site influence, executing a sampling plan, and producing this report. The report is organized as follows:

- Section 1, Introduction – Authority for performance of this work, goals for the project, and summary of the report contents;
- Section 2, Site Background – Site description, site operations and waste characteristics, and a summary of investigation locations;
- Section 3, Field Activities and Analytical Protocol – Summary of the field effort;
- Section 4, Quality Assurance/Quality Control (QA/QC) – Summary of the laboratory data;
- Section 5, Analytical Results Reporting and Background Samples – Discussion of results-reporting criteria and background sample locations and analytical results;
- Section 6, Potential Sources – Discussion of site sources, sample locations, and analytical results;
- Section 7, Migration/Exposure Pathways and Targets – Discussion of the migration/exposure pathways, sample locations, and analytical results;
- Section 8, Summary and Conclusions – Summary of the investigation and discussion of conclusions based on the information gathered during the investigation;

- Section 9, References – Alphabetical list of the references cited throughout the text;
- Appendix A, Sample Plan Alteration Form – Changes between the approved sample plan and the field event;
- Appendix B, Photographic Documentation – Photographs taken during the sampling event and site visit;
- Appendix C, Chain-of-Custody Documentation – Forms documenting sample chain-of-custody for the sampling event;
- Appendix D, Global Positioning System (GPS) Coordinates – Latitude and longitude coordinates of sample locations; and
- Appendix E, Data Validation Memoranda – Laboratory results and quality assurance evaluation for all samples.

# 2

## Site Background

This section describes the background of the site including location, description, ownership history, operations and source characteristics, and previous investigations, and provides a summary of the site investigation locations.

### 2.1 Site Location

Site Name:	Tuluksak River
CERCLIS ID Number:	AKN001002722
Site Address:	Tuluksak, Alaska
Latitude:	61° 00' 18.00" North (Nyac townsite)
Longitude:	159° 56' 48.61" West (Nyac townsite)
Borough:	Unorganized
Congressional District:	1
Site Owner:	Calista Corporation 301 Calista Court, Suite A Anchorage, Alaska 99518-3028 (907) 279-5516
Site Operator:	NYAC Mining Company 1634 W. 13th Ave. Anchorage, AK 99501
Site Contacts:	Jeff Foley, Geologist, and June McAtee, Geologist Calista Corporation 301 Calista Court, Suite A Anchorage, Alaska 99518-3028 (907) 279-5516

### 2.2 Site Description

The Tuluksak River site consists of the Tuluksak River from near its headwaters to its confluence with Granite Creek, and Bear and California creeks as well as their headwaters to their confluences with the Tuluksak River (Figure 2-1). The Fog River is a tributary of the Tuluksak River with a confluence located within 10 miles of the city of Tuluksak. The city of Tuluksak, located at the confluence of the Kuskokwim and Tuluksak rivers, is approximately 35 miles northeast of Bethel, Alaska, near the Bering Sea (Figure 2-1). The Tuluksak River drains approximately 810 square miles. The Nyac townsite lies approximately 70 miles upstream of the city of Tuluksak on the Tuluksak River and is accessible only by aircraft. The upper portion of the Tuluksak River lies in the Kilbuck Mountains, and the lower portion lies in the plain of the Tuluksak and Kuskokwim rivers.

Potential contamination sources near the Tuluksak River include placer mining dredge spoils. Placer mining has been conducted in the upper reaches of the Tuluksak River for over 100 years. Gold was discovered in commercial quantities on Bear Creek by 1908 (Maddren 1915). Additionally, dredging of the Tuluksak River has been conducted. The Tuluksak River is a slow-moving, meandering stream over most of its length, cutting through several tundra areas in its lower section (Collazzi and Maurer 1987).

### **2.3 Site Ownership History**

The Tuluksak River lies within the Yukon Delta National Wildlife Refuge. The Calista Corporation, an Alaska Regional Native Corporation based in Anchorage, Alaska, owns the land where dredging is being conducted. The NYAC Mining Company leases the land for mining purposes.

### **2.4 Site Operations and Source Characteristics**

Gold was first discovered in the Nyac district on Bear Creek, a tributary of the Tuluksak River, near the mouth of Bonanza Creek in 1907 or 1908 and soon after gold was discovered on the Tuluksak River (Mindat.org 2009). Placer mining on Bear Creek was generally performed by simple open-cut, pick-and-shovel methods with small sluice boxes (Maddren 1915). Placer deposits occur with sand, gravel, and rock; they are usually deposited by flowing water or ice and contain metals that were once part of a lode deposit (EPA 1994).

Dredging began on the Tuluksak River in 1936 and for many years the mining in the district, which was mainly on the Tuluksak River, was carried out by the New York-Alaska Company and its successor, the New York-Alaska Gold Dredging Company. The company built a company town, Nyac and an extensive physical plant and community facilities including a hydroelectric power station to power the dredges, the town, and other mining in the district. In 1965, the property was taken over by the Tuluksak Dredging Company and since 1990, the Nyac Mining Company has been actively mining in the area under an agreement with the Calista Native Corporation, which now owns most of the placer claims in the district (Mindat.org 2009). Figure 2-1 includes the locations of dredge spoil piles on Granite Creek and the Tuluksak River.

Parts from a small wood-hulled dredge that had operated on Bear Creek between 1928 and 1935 were used to build a steel-hulled dredge on the Tuluksak River in 1936. In 1937, another steel-hulled dredge was built and began mining. Dredging continued in the 1960's by the New York-Alaska Dredging Company. There has also been extensive mechanized mining using draglines, tractors, and non-floating washing plants over the years along the Tuluksak. As of 2006, the Tuluksak River is marked by dredge tailings a thousand feet or more wide that extend almost continuously from the mouth of California Creek to about five miles below Nyac. In the early 1980's, Tuluksak Dredging and Northland Dredging rebuilt the steel-hulled dredge about 5 miles downstream from Nyac; they operated it for a year or more until they shut down as a result of a water-quality dispute. There is no public record of the production specifically from the Tuluksak River, but the district produced a minimum of 500,000 ounces of gold, all from placers, and a



## **2. Site Background**

large part of that came from the Tuluksak River judging on the extent of the tailings. (Mindat.org 2009)

Nine mines and/or prospects and dredge spoils piles were originally identified in the Sampling and Quality Assurance Plan (SQAP) as possible contributors to potential contamination to the Tuluksak River, including the California Creek mine, an unnamed prospect near California Creek; Upper Tuluksak River mine, an unnamed mine on the south side of the Tuluksak River; Tiny Gulch mine, Tuluksak River mine, NYAC Tuluksak River mine, Granite Creek mine, and the Tuluksak River prospect (E & E 2008a). However, once the field team arrived, it became apparent that many of these locations either did not exist, consisted of only a few shovels of soil, or were impossible to locate due to vegetation.

Gold is the primary mineral that is being mined; however, silver has also historically been mined. Due to the mining practices in the area, it is possible that contamination may migrate from the mines and dredge spoils along Bear Creek, California Creek, and the Tuluksak River to the town of Tuluksak.

Placer deposits are mineral-bearing deposits found in weathered residuum and alluvium. Placers are unconsolidated sedimentary deposits; however, depending on the nature of the associated materials, placers may be cemented to varying degrees. Placers occurring within the permafrost are usually frozen solid (EPA 1994).

Gold placer mining consists of three major steps: extraction, beneficiation, and processing. Extraction is defined as removing ore material from a deposit and encompasses all activities prior to beneficiation. Historically, large-scale placer mining operations used hydraulic methods to excavate pay dirt, whereas small-scale methods for extraction of ore material included panning and suction dredging. In hydraulic mining, water under pressure is forced through an adjustable nozzle called a monitor or giant and directed at a bank to excavate gold placer pay streak (the zone where the economic concentration of gold is located) and to transport it to a recovery unit, which is generally a sluice box. The pressurized water jet can also be used to thaw frozen muck and to break up and wash away overburden. Small-scale methods combine extraction and beneficiation steps because the extraction phase of the placer operation is integrated with beneficiation. Panning is a fairly rudimentary gravity separation technique that recovers gold concentrate. It is also a method used by prospectors to evaluate a placer gold deposit to determine whether it can be mined profitably (EPA 1994). Water gravity processing was used to extract the gold from the mined materials on the Tuluksak River (McAtee 2009).

Beneficiation is the operation by which gold particles are separated from the large quantities of alluvial sediments. Beneficiation typically involves three general steps: the first is to remove grossly oversized material from the smaller fraction that contains the gold; the second to concentrate the gold; and the third to separate the fine gold from other fine, heavy metals. Equipment utilized during this operation include bulldozers, front-end loaders, backhoes, dragline or conveyor

belts, sluices, jigs, shaking tables, spiral concentrators, and pinched sluices. (EPA 1994)

Processing operations, which include smelting, generate final, marketable product bullion from the gold concentrate produced in beneficiation. Historically, the most severe impacts associated with placer mining activities have been physical disturbances to stream channels and the addition of large quantities of sediment downstream. This sediment may have contained increased concentrations of heavy metals generated as a result of mining activities (E & E 2008b). No chemical processing is known to have occurred at the site.

Dredge spoils generated during placer mining operations are potential sources of contamination. The spoils generated during mining operations along the Tuluksak River consist primarily of excess surficial material and do not include chemically-treated materials such as tailings that would remain after the extraction process. Dredge spoil piles at least 3 miles long and up to 0.4 miles wide are present along the Tuluksak River upstream from the confluence with Slate Creek (Figure 2-1; Hoare and Cobb 1977). The potential contaminants of concern at the site associated with these operations are target analyte list (TAL) metals, including arsenic, copper, and lead.

## **2.5 Previous Investigations**

A preliminary assessment (PA) was completed by E & E in 2008 for the EPA. The PA was performed to determine the potential for mining contamination to reach the Tuluksak River. A site visit was not conducted for the PA. The report concluded that waste materials from placer mining operations may be migrating from sources and impacting downstream targets, including wetlands and fisheries. (E & E 2008b)

## **2.6 Summary of SI Investigation Locations**

Sampling under the SI was conducted at areas (i.e., targets) that may have been contaminated through the migration of hazardous substances from site sources. The features identified for inspection under the Tuluksak River SI were determined based on interviews with regulatory agencies and a review of background information. These features are discussed below.

### **Sources**

**Dredge Spoils, Waste Sand Pile, and Dragline Pile:** Dredge spoils and the dragline pile are from placer mining exist along the rivers and may have released TAL metals to surface water. Dredge spoils piles are located along the Tuluksak River and a dragline pile is located along Granite Creek. The waste sand pile was located along Bear Creek. The source of the waste sand pile is unknown. This SI assisted in determining whether hazardous substances are associated with these sources.

### **Targets**

**Surface Water Bodies:** Surface water features adjacent to the dredge spoils, including the Tuluksak River and tributaries, may be contaminated as a result of

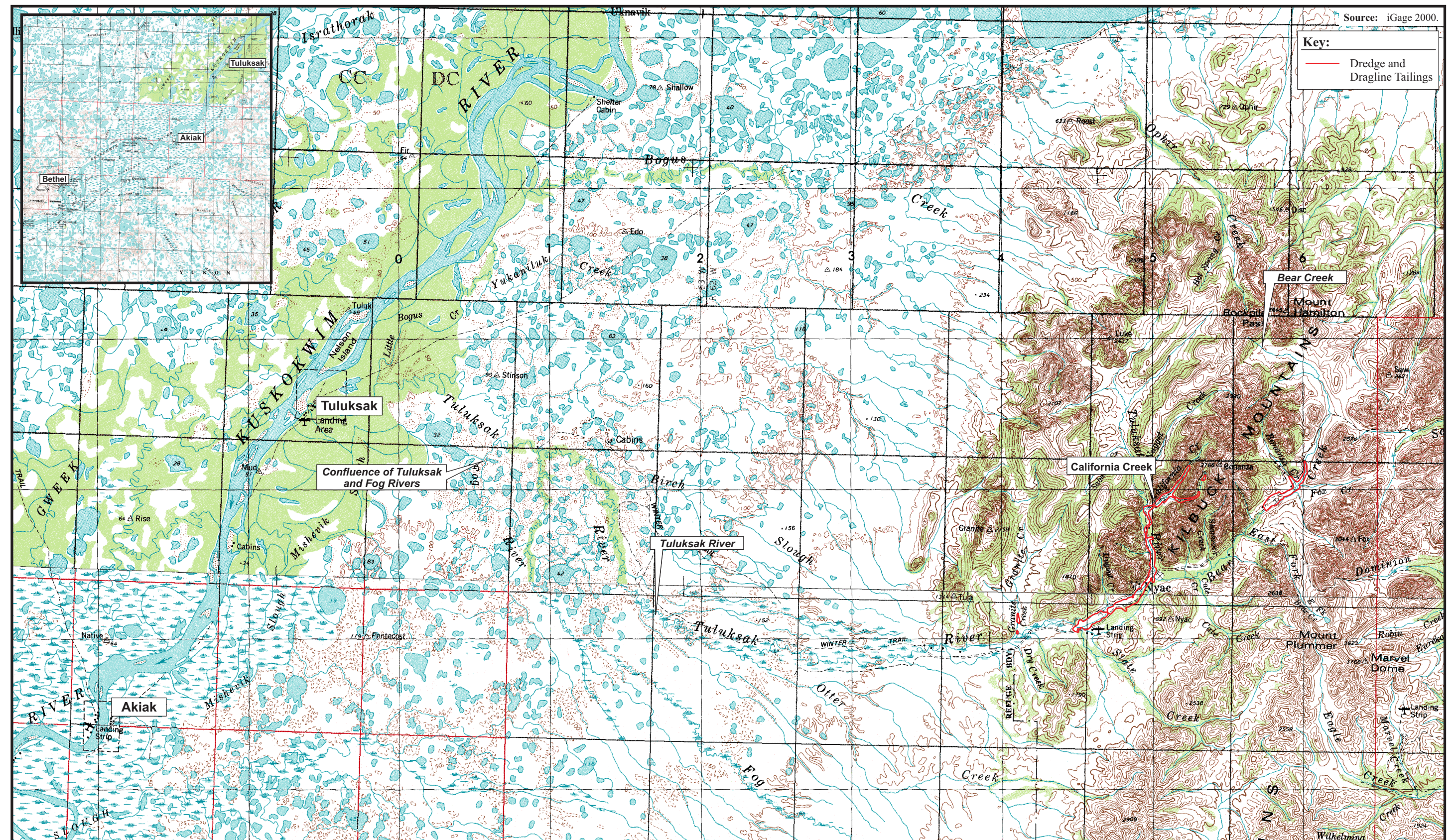


## ***2. Site Background***

historical mining activities. This SI assisted in determining whether hazardous substances associated with sources have migrated to surface water bodies.

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# 3

## Field Activities and Analytical Protocol

A SQAP for the Tuluksak River SI was developed by the START prior to field sampling (E & E 2008a). The SQAP describes the sampling strategy, sampling methodology, and analytical program used to investigate potential sources and targets. The SI field activities were conducted in accordance with the approved SQAP and the attached Sample Plan Alteration Forms (Appendix A). Deviations from the SQAP are described, when applicable, in this section and in the sampling location discussions in Section 6 (source areas) and Section 7 (target areas). All deviations to this SQAP were approved by the EPA Task Monitor (TM).

The SI field sampling event was conducted September 16 through 17, 2008. A total of 33 samples, including two background samples, were collected for the SI. Sample types and methods of collection are described below. A list of all samples collected for laboratory analysis under this SI is contained in Table 3-1. Photographic documentation is included in Appendix B.

Alphanumeric identification numbers applied by the START to each sample location (e.g., TR01SD) are used in the report as the sample location identifiers. Table 3-2 provides a key to the sample codes. The sample locations are depicted in Figure 3-1.

This section describes sampling methodology (subsection 3.1), analytical protocol (subsection 3.2), GPS (subsection 3.3), and investigation-derived waste (IDW; subsection 3.4).

### 3.1 Sampling Methodology

Grass, leaves and other vegetative material, rocks, and other debris unsuitable for analysis were removed from samples before the samples were placed into sample containers. Samples were stored on ice in coolers continuously maintained under the custody of START personnel. Chain-of-custody forms documenting the field samples are included in Appendix C. Sampling methods used for each sample type are described below.

#### 3.1.1 Sediment Sampling

A total of 33 sediment samples, including two background samples, were collected from known areas of sediment deposition. Sediment samples (0 to 6 inches below ground surface [bgs]) were collected using dedicated plastic scoops. The sample material was homogenized in-situ and then placed in certified pre-

### **3. Field Activities and Analytical Protocol**

cleaned, pre-labeled 8-ounce glass jars. Sediment sampling was conducted from the most downstream point and working upstream in order to avoid potential cross-contamination of sample points.

The dredge spoils and dragline pile are materials dredged from the river. Although found at the surface like soil samples, they are actually sediments that have been placed on the surface of the river banks. In the field, the sample matrix was listed as soil; however, the samples are actually sediment. Additionally, the waste sand piles were assigned a matrix code of soil; however, it is suspected they may be processed sediment.

#### **3.2 Analytical Protocol**

Table 3-1 presents the analyses applied to each of the samples used for this investigation. A total of 33 samples were submitted to a Contract Laboratory Program (CLP) laboratory, Chemtech Consulting Group of Mountainside, New Jersey, for analysis for TAL metals using EPA Method ILM05.4 (EPA 2007).

#### **3.3 Global Positioning System**

GPS points collected on the Tuluksak River were recorded from the readings on the helicopter. GPS points for samples collected from areas around the current mining activities were collected from a hand-held Garmin <sup>TM</sup> GPS unit. The Trimble Professional unit was not used, as planned in the SQAP, because of poor satellite reception. GPS coordinates are provided as Appendix D.

#### **3.4 Investigation-Derived Waste**

IDW generated during the SI sampling effort included disposable personal protective clothing and sampling equipment (i.e., dedicated bowls and spoons). The solid IDW was bagged in opaque plastic garbage bags and disposed of at the local municipal landfill. No liquid IDW was generated during the SI sampling effort. No IDW remains at the site.

**Table 3-1 Sample Collection and Analytical Summary**

EPA Sample ID	Station Location	CLP Sample ID	Sample Collection Date	Time	TAL Metals	Description
08384200	TR01SD	MJAA55	9/16/2008	1152	X	Tuluksak River. Two miles upstream of Tuluksak Village. Dark gray-green fine silt.
08384201	TR02SD	MJAA56	9/16/2008	1212	X	Tuluksak River. Dark gray-green silty sand.
08384202	TR03SD	MJAA57	9/16/2008	1227	X	Tuluksak River. Brown and gray sand.
08384203	TR04SD	MJAA58	9/16/2008	1245	X	Tuluksak River. Dark gray sand; some organics.
08384204	TR05SD	MJAA59	9/16/2008	1250	X	Tuluksak River. Thin brown gray silty sand below gray sandy silt.
08384205	TR06SD	MJAA60	9/16/2008	1305	X	Tuluksak River. Medium brown-gray sandy silt with organics.
08384206	TR07SD	MJAA61	9/16/2008	1315	X	Tuluksak River. Brown little red sand with small pebbles.
08384207	TR08SD	MJAA62	9/16/2008	1325	X	Tuluksak River. Brown-gray sand.
08384208	TR09SD	MJAA63	9/16/2008	1410	X	Tuluksak River. Brown and reddish sand with pebbles.
08384209	TR10SD	MJAA64	9/16/2008	1420	X	Tuluksak River. Brown sand with organics
08384210	TR11SD	MJAA65	9/16/2008	1430	X	Tuluksak River. Brown-red sand.
08384211	TR12SD	MJAA66	9/16/2008	1440	X	Tuluksak River. Brown-red sand with silt layer on top.
08384212	TR13SD	MJAA67	9/16/2008	1450	X	Tuluksak River. Brown-gray sand with organics.
08384213	TR14SD	MJAA68	9/16/2008	1500	X	Tuluksak River. Brown-red sand.
08384214	TR15SD	MJAA69	9/17/2008	0950	X	Tuluksak River. Red-brown sand. Downstream of lowest tailings pile.
08384215	TR16SD	MJAA70	9/17/2008	1230	X	Tuluksak River. Fine sand, medium brown.
08384216	TR17SD	MJAA71	9/17/2008	1315	X	Tuluksak River. Red-brown sand. Below California Creek confluence.
08384217	TR18SD	MJAA72	9/17/2008	1420	X	Tuluksak River. Brown-red coarse sand. Upstream of Tuluksak River mines and downstream of California Creek Mines.
08384228	FR01SD	MJAA83	9/16/2008	1247	X	Fog River. Brown silty sand top - brown-gray sandy silt.
08384229	GC01SO	MJAA84	9/16/2008	1630	X	Granite Creek dragline tailings pile. Brown-red sand and gravel.
08384230	GC02SO	MJAA85	9/16/2008	1633	X	Granite Creek dragline tailings pile. Red-brown pebbles with sand.
08384231	GC03SO	MJAA86	9/16/2008	1638	X	Granite Creek dragline tailings pile. Red-brown sand and gravel. Some organics.
08384232	GC04SD	MJAA87	9/16/2008	1645	X	PPE into Granite Creek from dragline tailings pile. Gray pebbles, little sand and organics.
08384240	TP01SD	MJAA95	9/17/2008	1650	X	Upper Bear Creek Tailings Pond. Light brown silty clay.
08384241	WS01SO	MJAA96	9/17/2008	1510	X	Waste sand from stockpiles. Medium brown sand with gravel.
08384242	WS02SO	MJAA97	9/17/2008	1512	X	Waste sand from stockpiles. Medium brown sand with gravel.
08384243	WS03SO	MJAA98	9/17/2008	1515	X	Waste sand from stockpiles. Medium brown sand with gravel.
08384261	DS01SO	MJAAB6	9/17/2008	1105	X	Light brown clay with gravel.
08384262	DS02SO	MJAAB7	9/17/2008	1150	X	Reddish-brown clay.
08384263	DS03SO	MJAAB8	9/17/2008	1240	X	Reddish-brown clay.
08384301	BG01SD	MJAAF6	9/16/2008	1615	X	Background and MS/MSD. Granite Creek above dragline tailings piles. Brown layer with sandy silt on top. Brown-red sand.
08384302	BG02SD	MJAAF7	9/17/2008	1610	X	Background and MS/MSD. Bear Creek above mining areas. Red-brown sand with small pebbles and organics.
08384303	BC01SD	MJAAF8	9/17/2008	1740	X	Bear Creek. Brown silty sand.

Key:

CLP = Contract Laboratory Program.

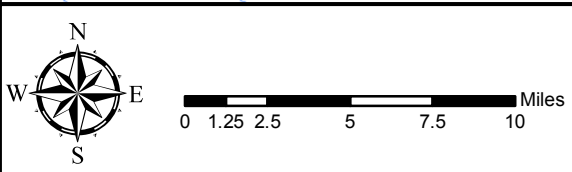
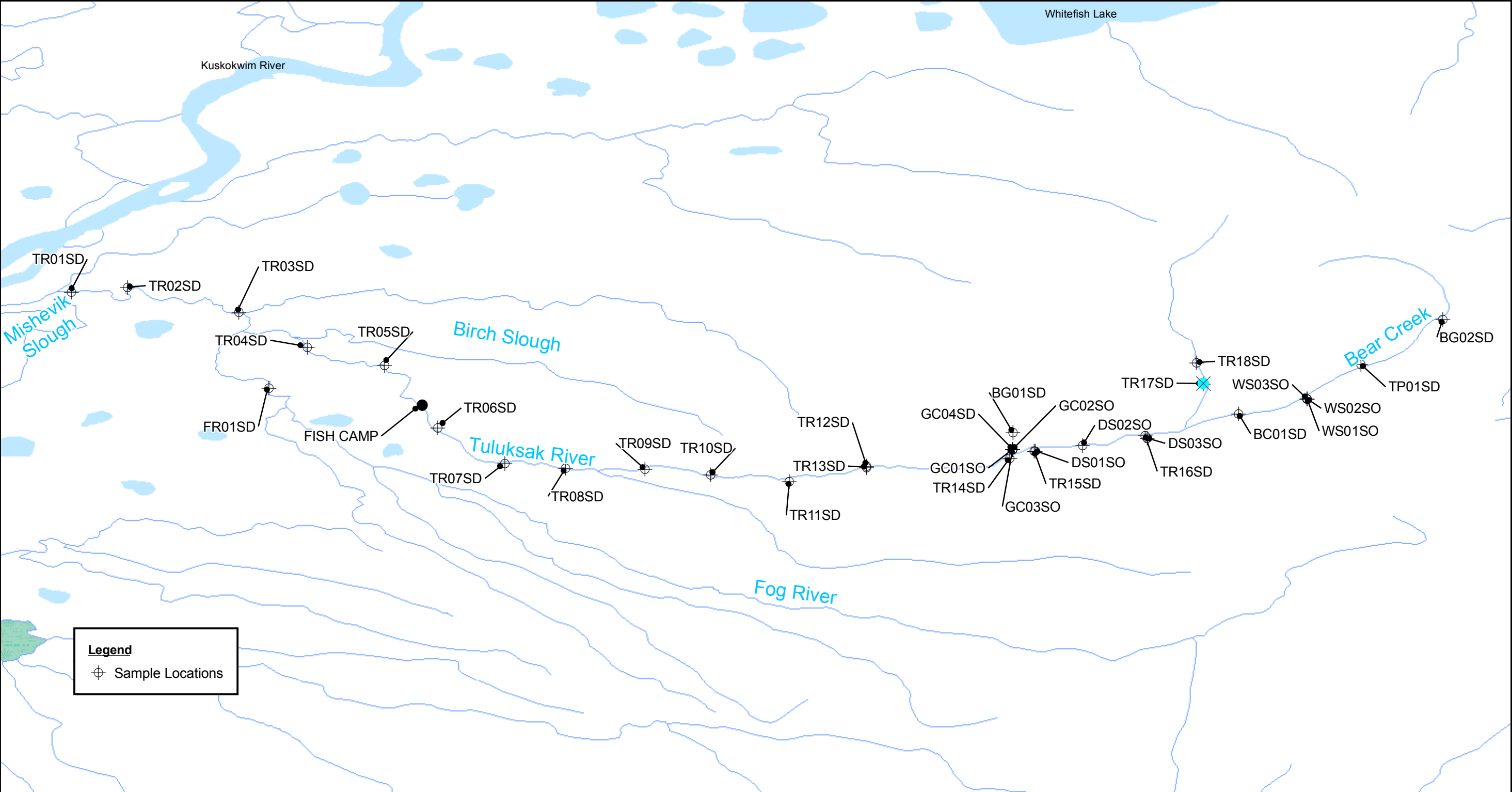
EPA = United States Environmental Protection Agency.

ID = Identification.

MS = Matrix spike.



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**Tuluksak River  
Site Investigation**

**Tuluksak, Alaska**

**Figure 3-1  
Sample Location Map**

Map Source Information: ESRI	
Date: 1/27/09	GIS Analyst: amm
Project ID: 002233.0324.01SI	

\\START131\tuluksak River\GIS\Fig3-1\_SampleLocations.mxd

# 4

## Quality Assurance/ Quality Control

QA/QC data are necessary to determine precision and accuracy and to demonstrate the absence of interferences and/or contamination of sampling equipment, glassware, and reagents. Specific QC requirements for laboratory analyses are incorporated in the *Contract Laboratory Program Statement of Work for Inorganic Analyses* (EPA 2007). These QC requirements or equivalent requirements found in the analytical methods were followed for analytical work on the SI. This section describes the QA/QC measures taken for the SI and provides an evaluation of the usability of data presented in this report.

Data from the CLP laboratory were reviewed and validated by an EPA chemist. Data qualifiers were applied as necessary according to *USEPA Contract Laboratory Program National Functional Guidelines for Inorganic Data Review* (2004).

In the absence of other QC guidance, method- and/or standard operating procedure (SOP)-specific QC limits were also utilized to apply qualifiers to the data.

### 4.1 Satisfaction of Data Quality Objectives

The guidance document used to establish data quality objectives (DQOs) for this SI was *Guidance for the Data Quality Objectives Process* (EPA QA/G-4), EPA/600/R-96/055 (EPA 2000).

The EPA Task Monitor determined that definitive data without error and bias determination would be used for the sampling and analyses conducted during the field activities. The data quality achieved during the field work produced sufficient data that met the DQOs stated in the SQAP (E & E 2008a). A detailed discussion of accomplished SI objectives is presented in the following sections.

### 4.2 QA/QC Samples

QA samples (trip and rinsate blanks) were not collected. Trip blanks are not required for TAL metals analyses. Rinsate blank samples were not collected because all sample collection equipment was dedicated.

QC samples included matrix spike (MS)/duplicate samples for inorganic analyses at a rate of one MS/duplicate per 20 samples per matrix.

### **4.3 Project-Specific Data Quality Objectives**

The laboratory data were reviewed to ensure that DQOs for the project were met. The following describes the laboratories' abilities to meet project DQOs for precision, accuracy, and completeness and the field team's ability to meet project DQOs for representativeness and comparability. The laboratories and the field team were able to meet DQOs for the project.

#### **4.3.1 Precision**

Precision measures the reproducibility of the sampling and analytical methodology. Laboratory and field precision is defined as the relative percent difference (RPD) between duplicate sample analyses. The laboratory duplicate samples measure the precision of the analytical method. The RPD values were reviewed for all laboratory samples. All duplicate RPD values were within QC limits; therefore, the project DQO for precision of 90% was met.

#### **4.3.2 Accuracy**

Accuracy measures the strength of the relationship between true values and their predictions. Laboratory accuracy is defined as the MS percent recovery (%R) for all laboratory analyses. The MS %R values were reviewed for all MS analyses. A total of 33 sample results (approximately 4.2% of the data) were qualified as estimated quantities (J or UJ) based on MS outliers; therefore, the project DQO for accuracy of 90% was met.

#### **4.3.3 Completeness**

Data completeness is defined as the percentage of usable data (usable data divided by the total possible data). All laboratory data were reviewed for data validation and usability. No sample results were rejected; therefore, the project DQO for completeness of 90% was met.

#### **4.3.4 Representativeness**

Data representativeness expresses the degree to which sample data accurately and precisely represent a characteristic of a population, parameter variations at a sampling point, or an environmental condition. The number and selection of samples were determined in the field to account for site variations and sample matrices. The project DQO for representativeness of 90% was met.

#### **4.3.5 Comparability**

Comparability is a qualitative parameter expressing the confidence with which one data set can be compared with another. Data produced for this site followed applicable field sampling techniques and specific analytical methodology. The project DQO for comparability of 90% was met.

### **4.4 Laboratory QA/QC Parameters**

The laboratory data also were reviewed for holding times/temperatures, laboratory blank samples, serial dilution analyses, and interference check sample analyses. These QA/QC parameters are summarized below. In general, the laboratory and field QA/QC parameters were considered acceptable.



#### **4. Quality Assurance/Quality Control**

##### **4.4.1 Holding Times/Temperatures**

All samples were analyzed within QC holding time limits and all samples were maintained within QC temperature limits.

##### **4.4.2 Laboratory Blanks**

All laboratory blanks met the frequency criteria. No potential contaminants of concern were detected in the laboratory blanks.

##### **4.4.3 Serial Dilution**

Serial dilution analyses were performed at a frequency of one per 20 samples per matrix, meeting QC frequency criteria. A total of 72 sample results (approximately 9.1% of the data) were qualified as estimated quantities (J or UJ) based on serial dilution outliers.

##### **4.4.4 Interference Check Samples**

Interference check sample analyses were performed at a frequency of one per 20 samples per matrix for TAL metals, meeting QC frequency criteria. All interference check sample results were within QC limits.

# 5

## Analytical Results Reporting and Background Samples

This section describes the reporting and methods applied to analytical results presented in Sections 6 (sources) and 7 (targets) of this report, and discusses background locations and sample results. Table 3-1 lists all samples collected for laboratory analysis.

### 5.1 Analytical Results Evaluation Criteria

Analytical results presented in the summary tables of Sections 6 and 7 show all analytes detected above laboratory detection limits in bold type. Analytical results indicating significant concentrations of contaminants in source samples (Section 6) or elevated concentrations of contaminants in target samples (Section 7) with respect to background concentrations are shown underlined and in bold type. For the purposes of this investigation, significant/elevated concentrations are those concentrations that are:

- Equal to or greater than the sample's Contract-Required Quantitation Limit (CRQL); and
- Equal to or greater than the background sample's CRQL when the background concentration was below detection limits; or
- At least three times greater than the background concentration when the background concentration equals or exceeds the detection limits.

The analytical summary tables present all detected compounds, but only those detected analytes at potential sources/targets meeting the significant/elevated concentration criteria are discussed in the report text. All detected concentrations are also discussed for the background samples. When samples were diluted for re-analysis at a laboratory, the dilution results were considered for evaluation and are provided in the tables.

#### 5.1.1 Sample Results Reporting

The analytes aluminum, calcium, iron, magnesium, potassium, and sodium are common earth crust elements. Based on EPA, Region 10 policy, these common earth crust elements will not be discussed in this report.

### 5.2 Background Samples

Background samples were collected for sediments (Figure 3-1). The background sediment results were also used for comparison with dragline pile, waste sand, and dredge spoil samples as these materials were similar in composition to the sediment samples. Results for the appropriate background samples are shown in

## **5. Analytical Results Reporting and Background Samples**

the first column(s) of the analytical results summary tables in Sections 6 and 7 for comparison with source and target results.

### **5.2.1 Background/Contribution Sediment Samples**

#### **5.2.1.1 Sample Locations**

The background sediment samples were collected: one on the Tuluksak River (TR18SD), one from Bear Creek (BG02SD), and one above the dredge spoil pile on Granite Creek (BG01SD). These samples were collected above any known mining activity.

A contribution sample was collected from the Fog River. This contribution sample was intended to help determine if this tributary is contributing sediment contamination to the Tuluksak River. This sample (FR01SD) is a contribution sediment sample for samples collected from the Tuluksak River downstream of the confluence with the Fog River.

#### **5.2.1.2 Sample Results**

Sample results are presented in Tables 6-1, 6-2, 7-1, 7-2, and 7-3. Sample results for background sediment sample TR18SD indicate the presence of ten TAL metals (arsenic, barium, cadmium, chromium, copper, lead, manganese, nickel, vanadium, and zinc) above the CRQL. Sample results for background sediment sample BG01SD indicate the presence of seven TAL metals (arsenic, barium, chromium, lead, manganese, vanadium, and zinc) above the CRQL. Sample results for background sediment sample BG02SD indicate the presence of nine TAL metals (arsenic, barium, cadmium, chromium, copper, lead, manganese, vanadium, and zinc) above the CRQL. Sample results for the contribution sample FR01SD indicate the presence of 11 TAL metals (arsenic, barium, cadmium, chromium, cobalt, copper, lead, manganese, nickel, vanadium, and zinc) above the CRQL.

# 6

## Potential Sources

This section describes potential sources, sample locations, and analytical results of SI samples obtained from potential sources. Laboratory data sheets of analytical results for all samples are provided in Appendix E.

The dredge spoils, dragline pile, and possibly waste sand, are materials dredged from the river. Although found at the surface like soil samples, it is suspected that these materials are actually sediments that have been placed on the surface of the river banks. For this reason, results for these samples were compared to the background sediment samples.

### 6.1 Granite Creek Dragline Pile

A dragline pile located near Granite Creek is approximately 600 feet long by 50 feet wide by an average of 3 feet thick for an approximate volume of 3,333 cubic yards (Figure 2-1). There is no evidence of a maintained engineered cover or a functioning and maintained run-on control system or a runoff management system. TAL metals from this pile may be leaching into Granite Creek and migrating to the Tuluksak River.

#### 6.1.1 Sample Locations

Three samples were collected from the Granite Creek dragline pile area (GC01SO through GC03SO). These samples consisted of brown-red sand with some gravel. Samples were collected between 0 and 6 inches bgs and analyzed for TAL metals.

#### 6.1.2 Sample Results

Sample results are presented in Table 6-1. Sample results indicate that no TAL metals were detected at significant concentrations with respect to background concentrations.

### 6.2 Waste Sand Piles

Three waste sand piles are located on Bear Creek. The volumes of these piles are estimated to be 11,983,375 cubic yards. The volume was calculated using satellite images and the assumption that the average pile height was 20 feet (Google 2009). There is no evidence of a maintained engineered cover or a functioning and maintained run-on control system or a runoff management system. TAL metals from this pile may be leaching into Bear Creek and migrating to the Tuluksak River.



**6.2.1 Sample Locations**

Three samples were collected from the waste sand pile area (WS01SO through WS03SO). The materials collected from these piles were primarily medium brown sands and gravel. Samples were collected between 0 and 6 inches bgs and analyzed for TAL metals.

**6.2.2 Sample Results**

Sample results are presented in Table 6-2. Sample results indicate the presence of a total of three TAL metals (cobalt, copper, and nickel) at significant concentrations with respect to background concentrations. Cobalt and nickel were detected at significant concentrations in all three waste sand pile samples, while copper was detected at a significant concentration only in sample WS01SO.

**6.3 Dredge Spoils**

Dredge spoil piles are located along the Tuluksak River between the landing strip and California Creek (Figure 2-1). Samples were collected at the locations shown in Figure 3-1. The volumes of these sampled piles are estimated to total 54,545,019 cubic yards. The volumes were calculated using satellite images and the assumption that the average pile heights were 20 feet (Google 2009). TAL metals from these piles may be leaching into the Tuluksak River.

**6.3.1 Sample Locations**

Three samples were collected from the dredge spoil piles (DS01SO through DS03SO). There is no evidence of a maintained engineered cover or a functioning and maintained run-on control system or a runoff management system. All of the samples contained sand, pebbles, and cobbles. The samples were collected between 0 and 6 inches bgs and analyzed for TAL metals.

**6.3.2 Sample Results**

Sample results are presented in Table 6-2. Sample results indicate the presence of a total of six TAL metals (cadmium, chromium, cobalt, copper, nickel, and zinc) at significant concentrations with respect to background concentrations. Of these analytes, cobalt, copper, and nickel were detected at significant concentrations in two of the three dredge spoils samples.

**Table 6-1 Granite Creek Dragline Pile Analytical Results Summary**

EPA Sample ID	08384302	08384229	08384230	08384231
CLP Sample ID	MJA AF7	MJAA84	MJAA85	MJAA86
Station Location	BG02SD	GC01SO	GC02SO	GC03SO
Description	Background		Granite Creek	
<b>Target Analyte List Metals (mg/kg)</b>				
Aluminum	<b>15400</b>	<b>7670</b>	<b>9250</b>	<b>11000</b>
Arsenic	<b>15.8</b>	<b>3.9</b>	<b>6.9</b>	<b>19.4</b>
Barium	<b>161</b>	<b>61.3</b>	<b>31.6</b>	<b>28.2</b>
Cadmium	<b>1.4</b>	0.48 JQ	<b>1.5</b>	<b>1.2</b>
Calcium	<b>4580</b>	<b>1400</b>	<b>1730</b>	<b>1520</b>
Chromium	<b>13.3</b>	<b>5.1</b>	<b>1.6</b>	<b>5.6</b>
Cobalt	10.1 JQ (SQL = 11.7)	<b>5.9</b>	4.3 JQ	5.2 JQ
Copper	<b>18.8</b>	<b>10.8</b>	<b>7.8</b>	<b>13.7</b>
Iron	<b>23900 JL</b>	<b>9770 JL</b>	<b>28100 JL</b>	<b>22200 JL</b>
Lead	<b>6.5</b>	<b>4.2</b>	<b>13.2</b>	<b>12.9</b>
Magnesium	<b>4380 JL</b>	<b>2190 JL</b>	<b>2320 JL</b>	<b>4100 JL</b>
Manganese	<b>1120 JL</b>	<b>149 JL</b>	<b>407 JL</b>	<b>319 JL</b>
Nickel	8.5 JQ (SQL = 9.3)	4.2 JQ	1.3 JQ	<b>5.3</b>
Potassium	555 JQ	<b>1500</b>	<b>1500</b>	<b>2130</b>
Vanadium	<b>51.0</b>	<b>30.9</b>	<b>22.6</b>	<b>18.4</b>
Zinc	<b>61.5 JL</b>	<b>24.4 JL</b>	<b>62.0 JL</b>	<b>56.2 JL</b>

Note:        Bold type indicates the sample result is above the contract required quantitation limit or sample quantitation limit.  
                  Underlining indicates the sample result is elevated as defined in Section 5.

Key:

CLP = Contract Laboratory Program.  
 EPA = United States Environmental Protection Agency.  
 ID = Identification.  
 J = The analyte was positively identified. The associated numerical value is an estimate.  
 L = Low bias.  
 mg/kg = Milligrams per kilogram.  
 Q = The result is estimated because the concentration is below the contract required quantitation limit or the sample quantitation limit.  
 U = The analyte was not detected at or above the reported limit.

**Table 6-2 Waste Sand and Tuluksak River Dredge Spoils Analytical Results Summary**

EPA Sample ID	08384302	08384241	08384242	08384243	08384261	08384262	08384263
CLP Sample ID	MJAAF7	MJAA96	MJAA97	MJAA98	MJAAB6	MJAAB7	MJAAB8
Station Location	BG02SD	WS01SO	WS02SO	WS03SO	DS01SO	DS02SO	DS03SO
Description	Background	Waste Sand			Dredge Spoils		
Target Analyte List Metals (mg/kg)							
Aluminum	15400	17300	19000	18200	29300	3290	40600
Arsenic	15.8	11.9	10.3	8.2	11.9	31.2	1.3 U
Barium	161	88.8	99.8	91.3	229	99.0	369
Beryllium	0.25 JQ (SQL = 1.2)	0.31 JQ	0.27 JQ	0.23 JQ	0.72	0.64	0.62 JQ
Cadmium	1.4	2.1	1.8	1.7	2.1	14.6	2.3
Calcium	4580	2200	2520	2290	3350	1810	17700
Chromium	13.3	18.1	12.3	13.7	6.9	21.3	48.0
Cobalt	10.1 JQ (SQL = 11.7)	13.4	14.6	13.9	10.8	22.8	22.8
Copper	18.8	65.2	51.4	39.6	24.3	202	62.8
Iron	23900 JL	37000 JL	34000 JL	33000 JL	31700 JL	49900 JL	39800 JL
Lead	6.5	10.0	5.2	4.1	9.7	16.0	3.4
Magnesium	4380 JL	9510 JL	11100 JL	10200 JL	11600 JL	758 JL	13700 JL
Manganese	1120 JL	480 JL	514 JL	457 JL	761 JL	2210 JL	874 JL
Nickel	8.5 JQ (SQL = 9.3)	11.8	12.1	9.8	5.4	31.0	28.1
Potassium	555 JQ	527 JQ	534 JQ	495 JQ	10700	823	678
Vanadium	51.0	83.7	79.7	75.3	72.4	69.2	97.7
Zinc	61.5 JL	44.9 JL	45.0 JL	40.8 JL	65.6 JL	1300 JL	41.1 JL

Note:        **Bold type indicates the sample result is above the contract required quantitation limit or sample quantitation limit.**  
                  **Underlining indicates the sample result is elevated as defined in Section 5.**

## Key:

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EPA = United States Environmental Protection Agency.

ID = Identification.

J = The analyte was positively identified. The associated numerical value is an estimate.

L = Low bias.

mg/kg = Milligrams per kilogram.

Q = The result is estimated because the concentration is below the contract required quantitation limit or the sample quantitation limit.

U = The analyte was not detected at or above the reported limit.

# 7

## Surface Water Migration Pathway and Targets

The surface water migration pathway target distance limit (TDL) begins at the probable point of entry (PPE) and extends downstream for 15 miles or to the furthest point where elevated concentrations of hazardous substances associated with the sources is documented. Figure 7-1 depicts the surface water migration pathway TDL. The groundwater migration, soil exposure, and air migration pathways were not evaluated per direction of the EPA TM because of a lack of targets for each pathway.

### 7.1 Overland Pathway

PPE1 for the site is the entire length of the dredge spoils in the Tuluksak River and Bear Creek. PPE2 for the site is the length of the dredge spoils pile between sample locations GC01SO and GC03SO which are located on Granite Creek. PPE3 is at sample location GC04SD at the Granite Creek dragline tailings pile. The TDL begins at the most upstream point where dredge spoils are present in Bear Creek and continues for approximately 62 miles downstream in the Tuluksak River to sample location TR04SD, which is the most downstream point at which elevated concentrations are documented. This sample point is greater than 15 miles downstream of the most downstream source of contamination.

The flow rates of Bear Creek, Granite Creek, and the Tuluksak River are not recorded. It is estimated that the flow rates of Bear Creek and Granite Creek are between 10 and 100 cubic feet per second (cfs). The flow rate for the Tuluksak River is estimated to be greater than 100 cfs, but less than 1,000 cfs.

The 2-year 24-hour rainfall event for the area is 1.5 inches (ENRI UAA 1992). The average annual precipitation for Tuluksak, Alaska, is 66 inches (ADCED 2007). The drainage area for all sources at the site is greater than 100 and less than 1,000 acres (Hanson 2007). The total drainage area of the Tuluksak River is approximately 1,500 square miles (Maddren 1915).

Soils at the site are classified into three different principal components: Histic Pergelic Cryaquepts, Pergelic Cryofibrists, and Typic Cryofluvents (Rieger 1979).

The Histic Pergelic Cryaquepts comprise approximately 55% of the soils and are poorly drained on nearly level to moderate slopes in broad valleys and large basins. The soils developed in nonacid alluvium. Below a thick mat of partly decomposed organic matter, the soils have a mottled gray silt loam horizon that is

## **7. Surface Water Migration Pathway and Targets**

shallow over permafrost. In a few places on the terrains and ground moraines they have a gravelly substratum. (Rieger 1979)

The Pergelic Cryofibrists comprise approximately 40% of the soils and are poorly drained organic soils that lie in broad depressions and meander scars, and on the borders of shallow lakes. These soils consist of stratified layers of fibrous moss and sedge peat that is usually very strongly acid. The permafrost table is shallow. (Rieger 1979)

The Typic Cryofluvents comprise approximately 5% of the soils and are deep, well drained silty soils on nearly level natural levees bordering rivers. The soils consist of nonacid to calcareous stratified silty and fine sandy alluvium. In most places they are underlain by very gravelly sand. Permafrost is either deep or absent. (Rieger 1979)

Flood hazard data indicate that flooding occurred in the Tuluksak Village in the 1970s (USACE 1993). Based on this information, the START assumes the site area is within a 100-year flood plain.

### **7.2 Drinking Water Targets**

There are no drinking water intakes located within the TDL. Surface water is not used for the irrigation of five or more acres of commercial food or forage crops, for the watering of commercial livestock, as an ingredient in commercial food preparation, or as a major or designated water recreation area.

### **7.3 Human Food Chain Targets**

No commercial fishing is known to occur along the Tuluksak River (Bue 2007). Tribal members have reported eating fish caught from the Tuluksak River. The primary fishing area along the Tuluksak River is below the confluence with the Fog River approximately 6 miles upstream from the town of Tuluksak (McAtee 2008); however, a fish camp on the Tuluksak River approximately seven miles upstream of the confluence with the Fog River was noted from the helicopter while travelling upstream, therefore, a fishery is located within the TDL. In addition to tribal fishing, limited sport fishing occurs on the Tuluksak River. The fish harvest on the Tuluksak River is not recorded by Alaska Department of Fish and Game or by the local tribe (Chythlook 2008). It is not known if fishing occurs on Bear Creek or Granite Creek.

### **7.4 Environmental Targets**

Detailed wetland information is not available for the area therefore wetland frontage was determined during the sampling event. An aerial survey was conducted from the helicopter on September 16, 2008. It was estimated from the field biologist that palustrine emergent and palustrine scrub/shrub wetlands were present on the Tuluksak River from the confluence with the Kuskokwim River to the Tuluksak Mine. This length is longer than the entire TDL; therefore, wetlands are present on both sides of the river for the entire 62 mile TDL. Based on this, there are approximately 124 miles of wetland frontage within the TDL. (Mackey 2009)

## **7. Surface Water Migration Pathway and Targets**

The United State Fish and Wildlife Service manages terrestrial threatened and endangered species in the United States. There are no Federal-listed terrestrial threatened or endangered species in the TDL (Balough 2007). The National Oceanic and Atmospheric Administration manages all marine threatened and endangered species in the United States. There are no Federal-listed marine threatened or endangered species in the TDL (NOAA 2009).

### **7.5 Sample Locations and Results**

Sample results are reported from Bear Creek to the confluence with the Tuluksak River and for Granite Creek to the confluence with the Tuluksak River. Sample results on the Tuluksak River are reported by river segments to account for multiple background and contribution samples. From upstream to downstream, the segments are: Upstream of Bear Creek, Bear Creek to Fog River, and from the Fog River to the most downstream sample point. As background and contribution samples are added for comparison to Tuluksak River samples, the highest concentration per analyte was used for evaluation purposes.

#### **7.5.1 Bear Creek**

##### **7.5.1.1 Sediment Sample Locations**

A total of 2 sediment samples (BC01SD and TP01SD) were collected from Bear Creek, including one sediment sample from an excavated area on the creek

##### **7.5.1.2 Sediment Sample Results**

Sample results for the excavated area of Bear Creek and Bear Creek to the confluence with the Tulusak River are provided in Table 7-1. Sample results are compared to the background sample collected from Bear Creek (BG02SD). Three TAL metals (cobalt, copper, and nickel) were detected at elevated concentrations with respect to background concentrations. Cobalt and nickel were detected at elevated concentrations in both samples.

#### **7.5.2 Granite Creek**

##### **7.5.2.1 Sediment Sample Locations**

One sediment sample was collected from Granite Creek (GC04SD) near the confluence of the creek with the Tuluksak River.

##### **7.5.2.2 Sediment Sample Results**

Sample results for Granite Creek are provided in Table 7-2. Sample results are compared to the background sample collected from Bear Creek (BG01SD). Six TAL metals (arsenic, cadmium, chromium, cobalt, copper, and nickel) were detected at elevated concentrations with respect to background concentrations.

#### **7.5.3 Tuluksak River above the Confluence with Bear Creek**

##### **7.5.3.1 Sediment Sample Locations**

A total of 1 sediment sample was collected above the confluence with Bear Creek on the Tuluksak River (TR17SD).

## **7. Surface Water Migration Pathway and Targets**

### **7.5.3.2 Sediment Sample Results**

Sample results for the Tuluksak River to the confluence with Bear Creek are provided in Table 7-3. Sample results are compared to the background sample collected from the Tuluksak River (TR18SD). One TAL metal (cobalt) was detected at elevated concentrations with respect to background concentrations.

### **7.5.4 Tuluksak River above the Confluence with the Fog River**

#### **7.5.4.1 Sediment Sample Locations**

A total of 13 sediment samples were collected on the Tuluksak River between the confluence with Bear Creek and the confluence with the Fog River (TR04SD through TR16SD).

#### **7.5.4.2 Sediment Sample Results**

Sample results for the samples collected below the confluence with Bear Creek and above the confluence with the Fog River are provided in Table 7-4. The samples from this segment are compared to the background samples collected from Bear Creek (BG02SD) and the Tuluksak River (TR18SD). The highest detection for each analyte from both samples is used as the background sample concentration. Sample results indicated the presence of cobalt at elevated concentrations with respect to background concentrations in five samples (TR04SD, TR06SD, TR12SD, TR13SD, and TR16SD) and nickel at elevated concentrations with respect to background concentrations in five samples (TR04SD, TR06SD, TR07SD, TR08SD, and TR16SD).

### **7.5.5 Tuluksak River below the Confluence with the Fog River**

#### **7.5.5.1 Sediment Sample Locations**

A total of 3 sediment samples were collected below the confluence with the Fog River on the Tuluksak River (TR01SD through TR03SD).

#### **7.5.5.2 Sediment Sample Results**

Sample results for samples collected from the Tuluksak River below the confluence with the Fog River are provided in Table 7-5. The samples from this segment are compared to the background samples collected from the Tuluksak River (TR18SD) and Bear Creek (BG02SD) and the contribution sample collected from the Fog River (FR01SD). The highest detection for each analyte from all three samples is used as the background sample concentration. Sample results indicated no analytes at elevated concentrations with respect to background concentrations.

**Table 7-1 Bear Creek Sediment Samples Analytical Results Summary**

EPA Sample ID	08384302	08384240	08384303
CLP Sample ID	MJAAF7	MJAA95	MJAAF8
Station Location	BG02SD	TP01SD	BC01SD
Description	Background	Bear Creek	
Target Analyte List Metals (mg/kg)			
Aluminum	15400	33000	21100
Arsenic	15.8	17.1	19.2
Barium	161	273	167
Cadmium	1.4	2.5	1.7
Calcium	4580	6690	4700
Chromium	13.3	21.5	24.9
Cobalt	10.1 JQ (11.7 SQL)	22.0	15.2
Copper	18.8	63.4	25.5
Iron	23900 JL	41800 JL	33800 JL
Lead	6.5	14.4	7.2
Magnesium	4380 JL	10500 JL	7870 JL
Manganese	1120 JL	987 JL	687 JL
Nickel	8.5 JQ (9.3 SQL)	16.6	24.2
Potassium	555 JQ	1870	888 JQ
Vanadium	51.0	120	70.5
Zinc	61.5 JL	98.5 JL	79.6 JL

Note:                Bold type indicates the result is above the sample quantitation limit.  
                          Underline type indicates the sample result is elevated as defined in Section 5.

Key:

CLP = Contract Laboratory Program.  
 EPA = United States Environmental Protection Agency.  
 ID = Identification.  
 J = The analyte was positively identified. The associated numerical value is an estimate.  
 L = Low bias.  
 mg/kg = milligrams per kilogram.  
 Q = The result is estimated because the concentration is below the contract required quantitation limit.  
 SQL = Sample Quantitation Limit.



**Table 7-2 Granite Creek Sediment Samples Analytical Results Summary**

EPA Sample ID	08384301	08384232
CLP Sample ID	MJAAF6	MJAA87
Station Location	BG01SD	GC04SD
Description	Granite Creek Background	Granite Creek
<b>Target Analyte List Metals (mg/kg)</b>		
Aluminum	<b>3820</b>	<b>11700</b>
Arsenic	<b>1.4</b>	<u><b>5.2</b></u>
Barium	<b>66.2</b>	<b>48.2</b>
Cadmium	0.57 JQ (0.61 SQL)	<u><b>1.2</b></u>
Calcium	<b>1080</b>	<b>2310</b>
Chromium	<b>3.4</b>	<u><b>17.8</b></u>
Cobalt	4.2 JQ (6.1 SQL)	<u><b>9.7</b></u>
Copper	2.3 JQ (3.1 SQL)	<u><b>18.6</b></u>
Iron	<b>12000</b>	<b>23400 JL</b>
Lead	<b>2.3</b>	<b>5.7</b>
Magnesium	<b>2030</b>	<b>5570 JL</b>
Manganese	<b>255</b>	<b>293 JL</b>
Nickel	2.5 JQ (4.9 SQL)	<u><b>14.2</b></u>
Potassium	<b>634</b>	<b>823</b>
Vanadium	<b>21.1</b>	<b>50.4</b>
Zinc	<b>19.8 JL</b>	<b>52.4 JL</b>

Note:           Bold type indicates the result is above the sample quantitation limit.  
                       Underline type indicates the sample result is elevated as defined in Section 5.

**Key:**

CLP = Contract Laboratory Program.  
 EPA = United States Environmental Protection Agency.  
 ID = Identification.  
 J = The analyte was positively identified. The associated numerical value is an estimate.  
 L = Low bias.  
 mg/kg = milligrams per kilogram.  
 Q = The result is estimated because the concentration is below the contract required quantitation limit.  
 SQL = Sample Quantitation Limit.

**Table 7-3 Tuluksak River Sediment Sample Analytical Results Summary  
(Above Bear Creek Confluence)**

<b>EPA Sample ID</b>	<b>08384217</b>	<b>08384216</b>
<b>CLP Sample ID</b>	<b>MJAA72</b>	<b>MJAA71</b>
<b>Station Location</b>	<b>TR18SD</b>	<b>TR17SD</b>
<b>Description</b>	<b>Background</b>	<b>Tuluksak River</b>
<b>Target Analyte List Metals (mg/kg)</b>		
Aluminum	<b>5050</b>	<b>7190</b>
Arsenic	<b>4.5</b>	<b>6.7</b>
Barium	<b>72.4</b>	<b>91.3</b>
Cadmium	<b>0.69</b>	<b>0.79</b>
Calcium	<b>1630</b>	<b>2140</b>
Chromium	<b>9.8</b>	<b>11.6</b>
Cobalt	5.8 JQ (6.1 SQL)	<u><b>7.9</b></u>
Copper	<b>5.0</b>	<b>8.0</b>
Iron	<b>13500</b>	<b>15400</b>
Lead	<b>3.1</b>	<b>3.4</b>
Magnesium	<b>2770</b>	<b>3960</b>
Manganese	<b>322</b>	<b>402</b>
Nickel	<b>6.4</b>	<b>8.2</b>
Potassium	<b>749</b>	<b>996</b>
Vanadium	<b>29.7</b>	<b>36.2</b>
Zinc	<b>25.8 JL</b>	<b>35 JL</b>

Note:                      Bold type indicates the result is above the sample quantitation limit.  
                                  Underline type indicates the sample result is elevated as defined in Section 5.

**Key:**

CLP = Contract Laboratory Program.  
 EPA = United States Environmental Protection Agency.  
 ID = Identification.  
 J = The analyte was positively identified. The associated numerical value is an estimate.  
 L = Low bias.  
 mg/kg = milligrams per kilogram.  
 Q = The result is estimated because the concentration is below the contract required quantitation limit.  
 SQL = Sample Quantitation Limit.

Note: This page intentionally left blank.

Table 7-4    Tuluksak River Sediment Samples Analytical Results Summary (Between Bear Creek and Fog River Confluences)

EPA Sample ID	08384302	08384217	08384215	08384214	08384213	08384212	08384211	08384210	08384209	08384208	08384207	08384206	08384205	08384204	08384203
CLP Sample ID	MJAAF7	MJAA72	MJAA70	MJAA69	MJAA68	MJAA67	MJAA66	MJAA65	MJAA64	MJAA63	MJAA62	MJAA61	MJAA60	MJAA59	MJAA58
Station Location	BG02SD	TR18SD	TR16SD	TR15SD	TR14SD	TR13SD	TR12SD	TR11SD	TR10SD	TR09SD	TR08SD	TR07SD	TR06SD	TR05SD	TR04SD
Description	Background Tuluksak River														
Target Analyte List Metals (mg/kg)															
Aluminum	15400	5050	19800	13500	13000	17700	15500	11200	13200	11400	13900	13300	16300	13700	18400
Arsenic	15.8	4.5	23.1	11.8	15.1	12.7	14.2	8.4	10.5	7.3	8.7	7.3	8.7	13.6	17.8
Barium	161	72.4	152	103	87.1	135	121	76.1	98.5	62.7	85.8	76.4	104	134	161
Cadmium	1.4	0.69	1.9	1.4	1.4	1.6	1.6	1.1	1.4	1.2	1.5	1.5	1.8	1.8	2.2
Calcium	4580	1630	4340	2620	3000	4190	3720	2510	2720	2230	2420	2390	3040	2880	3500
Chromium	13.3	9.8	25.9	17.3	17.6	19.8	18.7	14.2	16.4	15.8	20.3	21.2	26.1	18.8	25.1
Cobalt	10.1 JQ (11.7 SQL)	5.8 JQ (6.1 SQL)	17.0	10.4	11.2	13.5	13.5	8.6	10.8	9.3	10.9	10.9	11.8	9.4	12.3
Copper	18.8	5.0	27.0	23.4	24.1	24.9	24.1	16.1	17.7	17.4	18.3	16.7	18.5	17.0	23.3
Iron	23900 JL	13500	35600	27200	26800	29300	30400	21200	25100	23500	27100	27700	33400	34100	39300
Lead	6.5	3.1	6.0	4.7	5.2	7.0	5.6	3.8	4.2	3.8	4.6	4.4	6.0	5.9	8.4
Magnesium	4380 JL	2770	9710	7930	6770	6550	7680	5360	6370	6100	6600	6450	7010	5060	5850
Manganese	1120 JL	322	670	665	591	637	768	501	505	536	715	537	395	401	519
Nickel	8.5 JQ (9.3 SQL)	6.4	23.6	15.6	15.7	16.3	17.4	12.9	15.7	16.1	20.6	23.0	26.2	16.4	21.6
Potassium	555 JQ	749	1000	875	800	1130	978	616 JQ	757	507 JQ	603 JQ	499 JQ	596 JQ	529 JQ	560 JQ
Vanadium	51.0	29.7	75.6	57.9	54.1	64.4	61.6	43.9	51.1	44.7	50.2	44.7	50.9	45.3	57.3
Zinc	61.5 JL	25.8 JL	75.6 JL	59.8 JL	55.9 JL	59.0 JL	64.3 JL	43.0 JL	51.9 JL	50.0 JL	58.2 JL	61.6 JL	72.0 JL	54.1 JL	72.7 JL

Note:                    Bold type indicates the result is above the sample quantitation limit.  
                             Underline type indicates the sample result is elevated as defined in Section 5.

Key:

CLP = Contract Laboratory Program.

EPA = United States Environmental Protection Agency.

ID = Identification.

J = The analyte was positively identified. The associated numerical value is an estimate.

L = Low bias.

mg/kg = milligrams per kilogram.

Q = The result is estimated because the concentration is below the contract required quantitation limit.

SQL = Sample Quantitation Limit.

**Table 7-5 Tuluksak River Sediment Samples Analytical Results Summary (Below Fog River Confluence)**

EPA Sample ID	08384302	08384217	08384228	08384202	08384201	08384200
CLP Sample ID	MJAAF7	MJAA72	MJAA83	MJAA57	MJAA56	MJAA55
Station Location	BG02SD	TR18SD	FR01SD	TR03SD	TR02SD	TR01SD
Description	Background	Fog River		Tuluksak River		
		Contribution				
Target Analyte List Metals (mg/kg)						
Aluminum	15400	5050	15300	14000	15100	13400
Arsenic	15.8	4.5	17.6	12.3	27.0	28.1
Barium	161	72.4	150	94.7	165	163
Cadmium	1.4	0.69	2.0	1.9	2.7	2.3
Calcium	4580	1630	3840	2900	3780	2890
Chromium	13.3	9.8	25.3	26.3	26.5	22.4
Cobalt	10.1 JQ (11.7 SQL)	5.8 JQ (6.1 SQL)	10.6	15.1	11.4	10.6
Copper	18.8	5.0	24.8	26.4	21.2	22.1
Iron	23900 JL	13500	37900	32600	46300	41300
Lead	6.5	3.1	8.7	7.1	7.6	8.2
Magnesium	4380 JL	2770	4580	6490	5170	4030
Manganese	1120 JL	322	583	939	443	575
Mercury	0.23 U	0.12 U	0.12 JQ (0.21 SQL)	0.12 U	0.20 U	0.20
Nickel	8.5 JQ (9.3 SQL)	6.4	25.7	32.2	26.5	21.4
Potassium	555 JQ	749	566 JQ	578 JQ	660 JQ	585 JQ
Vanadium	51.0	29.7	42.5	50.1	45.4	40.5
Zinc	61.5 JL	25.8 JL	72.7 JL	77.6 JL	77.9 JL	70.9 JL

Note: Bold type indicates the result is above the sample quantitation limit.

Underline type indicates the sample result is elevated as defined in Section 5.

Key:

CLP = Contract Laboratory Program.

EPA = United States Environmental Protection Agency.

ID = Identification.

J = The analyte was positively identified. The associated numerical value is an estimate.

L = Low bias.

mg/kg = milligrams per kilogram.

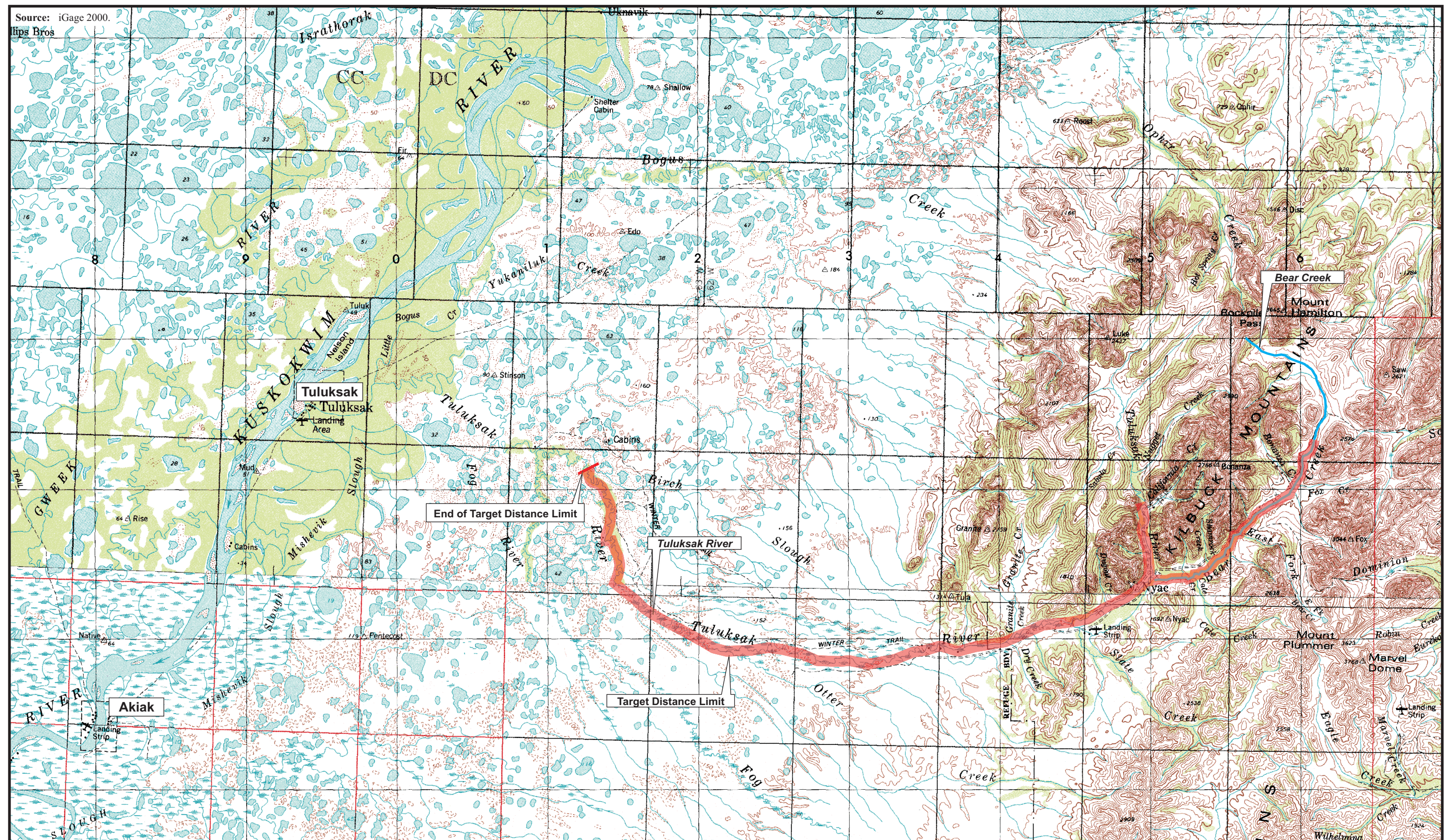
Q = The result is estimated because the concentration is below the contract required quantitation limit.

SQL = Sample Quantitation Limit.

U = The analyte was not detected at or above the reported limit.

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Source: iGage 2000.



**ecology and environment, inc.**  
International Specialists in the Environment  
Seattle, Washington



0 2.5 5  
Approximate Scale in Miles

TULUKSAK RIVER  
SITE INSPECTION  
Tuluksak, Alaska

Figure 7-1  
TARGET DISTANCE LIMIT MAP

Date:  
7/8/09

Drawn by:  
AES

10:START-3\08020017\fig 7-1



# 8

## Summary and Conclusions

In September 2008, the START conducted a field sampling event at the Tuluksak River site located near Tuluksak, Alaska. The city of Tuluksak is located at the confluence of the Kuskokwim and Tuluksak rivers. The Nyac townsite lies approximately 70 miles upstream of the city of Tuluksak on the Tuluksak River. Placer mining has been conducted at a number of locations in the upper reaches of the Tuluksak River for over 100 years. Additionally, dredging of the Tuluksak River has been conducted. Dredging and mining created an estimated volume of greater than 65,000,000 cubic yards of dredge spoil, dragline pile, and waste sand materials. The START collected 33 sediment samples during the two-day field event at various locations along Bear Creek, Granite Creek, and the Tuluksak River.

### 8.1 Sources

Sources associated with placer mining activities in the Tuluksak River include the Granite Creek dragline pile, three waste sand piles, and the dredge spoils piles on the Tuluksak River (Figure 2-1). A total of nine samples were collected from the sources, three from each location. Three TAL metals (cobalt, copper and nickel) were detected at significant concentrations in the waste sand pile samples, no TAL metals were detected at elevated concentrations in the dragline pile, and six TAL metals (cadmium, chromium, cobalt, copper, nickel, and zinc) were detected at significant concentrations in the dredge spoils piles samples. Based on analytical results, two of these sources appear to contain hazardous substances at significant concentrations.

### 8.2 Targets

There are no drinking water intakes located within the TDL. Surface water is not used as a water supply for more than five acres of commercial food crops, in commercial food preparation, or to water livestock.

No commercial fishing is known to occur along the Tuluksak River. Tribal members have reported eating fish caught from the Tuluksak River and the primary fishing area along the Tuluksak River is below the confluence with the Fog River; however, a fish camp was located within the TDL above the confluence with the Fog River, therefore a fishery is located within the influence of the site. Fish harvesting on the Tuluksak River is not recorded and limited sport fishing occurs.

## **8. Summary and Conclusions**

Detailed wetland information is not available for the area. Observations during the sampling event indicate there are approximately 124 miles of wetland frontage along the TDL. There are no Federal- or State-listed threatened or endangered species within the TDL.

A total of 21 target samples were collected. The TAL metals cobalt, copper, and nickel were detected at elevated concentrations in sediment samples from the excavated area on Bear Creek. The TAL metal cobalt was detected at elevated concentrations in the Tuluksak River sediment sample collected above the confluence with Bear Creek. The TAL metals arsenic, cadmium, chromium, cobalt, copper, and nickel were detected at elevated concentrations in Granite Creek. The TAL metals cobalt and nickel were detected at elevated concentrations in the Tuluksak River sediment samples collected between the confluences of Bear Creek and the Fog River. No TAL metals were detected at elevated concentrations in the Tuluksak River sediment samples collected below the confluence with the Fog River.

### **8.3 Conclusions**

Based on the results of the SI field sampling event, it appears that hazardous substances are migrating from sources to surface water targets. The TAL metals cobalt, copper, and nickel were detected at significant concentrations in the waste sand piles and the dredge spoils piles; and also were detected at elevated concentrations in the samples from Bear Creek and Granite Creek. Cobalt and nickel were detected at elevated concentrations in the Tuluksak River. Contaminated sediments are present from sample location TP01SD on Bear Creek downstream on the Tuluksak River to sample location TR04SD near the confluence with the Fog River. Fisheries and wetlands are present within this zone of contamination.

# 9

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# Sample Plan Alteration Forms



# SAMPLE PLAN ALTERATION FORM

Project Name and Number: Tuluksak River

Technical Direction Document Number 08-02-0017

Material to be Sampled: Surface soil

Measurement Parameters: Target analyte list metals




Standard Procedure for Field Collection & Laboratory Analysis (cite references): Not applicable

Reason for Change in Field Procedure of Analytical Variation: Field conditions were significantly different than those anticipated in the SQAP. The differences in field conditions than those anticipated are partially due to a site visit not being conducted. A site visit was not conducted due to the remote location and the costs associated with two mobilizations.

Variation from Field or Analytical Procedure:

- Mine Tailings/Waste Rock Piles: A maximum of 27 soil samples were planned but were not collected. Initially, it was thought that up to nine independent mines were present; however, upon arrival at the site it was discovered that the "mines" consisted of only a few shovels full of dirt; therefore, no mine tailings/waste rock pile samples were collected. This deviation was enacted on September 17, 2008.

Special Equipment, Materials, or Personnel Required: Not applicable

CONTACT	APPROVED SIGNATURE	DATE
Initiator: Renee Nordeen		July 7, 2009
START PL: Renee Nordeen		July 7, 2009
EPA TM: Brandon Perkins		7/13/2009

EPA QA Officer: Gina Grepo-Grove  
Bethany Please for

B. Plume

7/27/09

## SAMPLE PLAN ALTERATION FORM

Project Name and Number: Tuluksak River

Technical Direction Document Number 08-02-0017

Material to be Sampled: Surface soil and sediment

Measurement Parameters: Target analyte list metals




Standard Procedure for Field Collection & Laboratory Analysis (cite references): Not applicable

Reason for Change in Field Procedure of Analytical Variation: Field conditions were significantly different than those anticipated in the SQAP. The differences in field conditions than those anticipated are partially due to a site visit not being conducted. A site visit was not conducted due to the remote location and the costs associated with two mobilizations.

Variation from Field or Analytical Procedure:

- Dredge and Dragline Tailings: A maximum of 30 samples were planned of one sample per 2,000 cubic yards of material and no more than three samples per pile. Less piles than were anticipated were encountered; therefore, only six of the 30 samples were collected. This alteration was enacted on September 16 and 17, 2008.

Special Equipment, Materials, or Personnel Required: Not applicable

CONTACT	APPROVED SIGNATURE	DATE
Initiator: Renee Nordeen		July 7, 2009
START PL: Renee Nordeen		July 7, 2009
EPA TM: Brandon Perkins		7/13/2009

EPA QA Officer: Gina Grepo-Grove Bethany Pleue for	Barleue	7/27/09
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## SAMPLE PLAN ALTERATION FORM

Project Name and Number: Tuluksak River

Technical Direction Document Number 08-02-0017

Material to be Sampled: Sediment

Measurement Parameters: Target analyte list metals



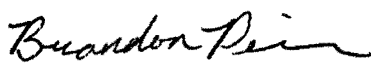
Standard Procedure for Field Collection & Laboratory Analysis (cite references): Not applicable

Reason for Change in Field Procedure of Analytical Variation: Field conditions were significantly different than those anticipated in the SQAP. The differences in field conditions than those anticipated are partially due to a site visit not being conducted. A site visit was not conducted due to the remote location and the costs associated with two mobilizations.

Variation from Field or Analytical Procedure:

- PPE Samples: A maximum of 19 PPE sediment samples were planned but only one was collected on Granite Creek near the dragline tailings pile. The PPEs were anticipated to be collected for each of the individual mines; however, upon arrival at the site, it was discovered that the "mines" consisted of only a few shovels of dirt; therefore, there were not 19 PPEs at the site. This change was enacted on September 17, 2008.

Special Equipment, Materials, or Personnel Required: Not applicable

CONTACT	APPROVED SIGNATURE	DATE
Initiator: Renee Nordeen		July 7, 2009
START PL: Renee Nordeen		July 7, 2009
EPA TM: Brandon Perkins		7/13/2009

EPA QA Officer: Gina Grepo-Grove Bethany Flewe for	BARLume	7/27/09
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## SAMPLE PLAN ALTERATION FORM

Project Name and Number: Tuluksak River

Technical Direction Document Number 08-02-0017

Material to be Sampled: Sediment

Measurement Parameters: Target analyte list metals



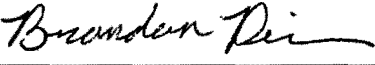
Standard Procedure for Field Collection & Laboratory Analysis (cite references): Not applicable

Reason for Change in Field Procedure of Analytical Variation: Field conditions were significantly different than those anticipated in the SQAP. The differences in field conditions than those anticipated are partially due to a site visit not being conducted. A site visit was not conducted due to the remote location and the costs associated with two mobilizations.

Variation from Field or Analytical Procedure:

- Streams: A maximum of 25 samples were planned based on a visual survey of the topographic maps of the area. Samples were collected from each point that was accessible (approximately every 2 miles for the lower river) and where they were accessible by vehicle in the upper portion of the river. A total of 21 samples were collected from the streams. This alteration was enacted on September 16 and 17, 2008.

Special Equipment, Materials, or Personnel Required: Not applicable

CONTACT	APPROVED SIGNATURE	DATE
Initiator: Renee Nordeen		July 7, 2009
START PL: Renee Nordeen		July 7, 2009
EPA TM: Brandon Perkins		7/13/2009



EPA QA Officer: Gina Grepo-Grove Bethany Plawe for	Bd Plume	7/27/09
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## SAMPLE PLAN ALTERATION FORM

Project Name and Number: Tuluksak River

Technical Direction Document Number 08-02-0017

Material to be Sampled: Sediment

Measurement Parameters: Target analyte list metals


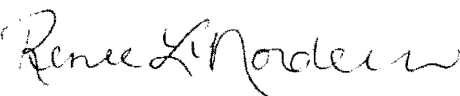
Standard Procedure for Field Collection & Laboratory Analysis (cite references): Not applicable

Reason for Change in Field Procedure of Analytical Variation: Field conditions were significantly different than those anticipated in the SQAP. The differences in field conditions than those anticipated are partially due to a site visit not being conducted. A site visit was not conducted due to the remote location and the costs associated with two mobilizations.

Variation from Field or Analytical Procedure:

- Background Sediment: A maximum of seven sediment samples were planned. California Creek above mining activities could not be accessed; therefore, no sample was collected. Additionally, background samples were planned to be collected upgradient of "mine" activities; however upon arrival at the site, it was discovered that the "mines" consisted of a few shovels of dirt; therefore, there was no need to collect background samples since there were no sources samples collected. This alteration was enacted on September 16 and 17, 2008.

Special Equipment, Materials, or Personnel Required: Not applicable

CONTACT	APPROVED SIGNATURE	DATE
Initiator: Renee Nordeen		July 7, 2009
START PL: Renee Nordeen		July 7, 2009

EPA TM: Brandon Perkins	<i>Brandon Perkins</i>	7/13/2009
EPA QA Officer: Gina Grepo-Grove Bethany Plewe for	<i>B. Plewe</i>	7/27/09

## SAMPLE PLAN ALTERATION FORM

Project Name and Number: Tuluksak River

Technical Direction Document Number 08-02-0017

Material to be Sampled: Surface soil

Measurement Parameters: Target analyte list metals




Standard Procedure for Field Collection & Laboratory Analysis (cite references): Not applicable

Reason for Change in Field Procedure of Analytical Variation: Field conditions were significantly different than those anticipated in the SQAP. The differences in field conditions than those anticipated are partially due to a site visit not being conducted. A site visit was not conducted due to the remote location and the costs associated with two mobilizations.

Variation from Field or Analytical Procedure:

- Background Soil: Because there were no "mines" or tailings/waste rock samples collected for the site, and the dredge spoil and dragline samples more closely resembled sediments, no background soil samples were collected. This alteration was enacted on September 17, 2008.

Special Equipment, Materials, or Personnel Required: Not applicable

CONTACT	APPROVED SIGNATURE	DATE
Initiator: Renee Nordeen		July 7, 2009
START PL: Renee Nordeen		July 7, 2009
EPA TM: Brandon Perkins		7/13/2009

EPA QA Officer: Gina Grepo-Grove Bethany Prewer for	B. Prewer	7/27/09
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## SAMPLE PLAN ALTERATION FORM

Project Name and Number: Tuluksak River

Technical Direction Document Number 08-02-0017

Material to be Sampled: Sediment

Measurement Parameters: Target analyte list metals





Standard Procedure for Field Collection & Laboratory Analysis (cite references): Not applicable

Reason for Change in Field Procedure of Analytical Variation: Field conditions were significantly different than those anticipated in the SQAP. The differences in field conditions than those anticipated are partially due to a site visit not being conducted. A site visit was not conducted due to the remote location and the costs associated with two mobilizations.

Variation from Field or Analytical Procedure:

- Tailings Pond: No samples were planned for this feature because it was not known to exist. Upon discovery of the pond a sample was collected. This alteration was enacted on September 17, 2008.

Special Equipment, Materials, or Personnel Required: Not applicable

CONTACT	APPROVED SIGNATURE	DATE
Initiator: Renee Nordeen		July 7, 2009
START PL: Renee Nordeen		July 7, 2009
EPA TM: Brandon Perkins		7/13/2009
EPA QA Officer: Gina Grepo-Grove Bethany Plewe for		7/27/2009

## SAMPLE PLAN ALTERATION FORM

Project Name and Number: Tuluksak River

Technical Direction Document Number 08-02-0017

Material to be Sampled: Sediment

Measurement Parameters: Target analyte list metals

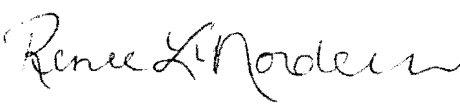



Standard Procedure for Field Collection & Laboratory Analysis (cite references): Not applicable

Reason for Change in Field Procedure of Analytical Variation: Field conditions were significantly different than those anticipated in the SQAP. The differences in field conditions than those anticipated are partially due to a site visit not being conducted. A site visit was not conducted due to the remote location and the costs associated with two mobilizations.

Variation from Field or Analytical Procedure:

- Waste Sand: No samples were planned for this feature because it was not known to exist. Upon discovery of the piles, one sample from each pile was collected for a total of three samples. This alteration was enacted on September 17, 2008.

Special Equipment, Materials, or Personnel Required: Not applicable

CONTACT	APPROVED SIGNATURE	DATE
Initiator: Renee Nordeen		July 7, 2009
START PL: Renee Nordeen		July 7, 2009
EPA TM: Brandon Perkins		7/13/2009
EPA QA Officer: Gina Grepo-Grove <i>Bethany Plewe for</i>		7/27/09



## SAMPLE PLAN ALTERATION FORM

Project Name and Number: Tuluksak River

Technical Direction Document Number 08-02-0017

Material to be Sampled: Not applicable



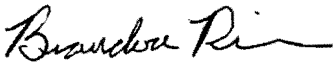

Measurement Parameters: Global positioning system coordinates.

Standard Procedure for Field Collection & Laboratory Analysis (cite references): Not applicable

Reason for Change in Field Procedure of Analytical Variation: Helicopter global positioning system (GPS) readings were used for downstream Tuluksak River sample locations to save time. The Trimble™ Professional GPS unit was not used for areas near current mining activities, as planned in the SOAP, because of poor satellite reception.

Variation from Field or Analytical Procedure: GPS points collected on the Tuluksak River were recorded from the readings on the helicopter (used to access remote sample locations) instead of using an EPA GPS unit. GPS points for samples collected from areas around the current mining activities were collected from a hand-held Garmin™ GPS unit. This alteration was enacted on September 16 and 17, 2008.

Special Equipment, Materials, or Personnel Required: Not applicable

CONTACT	APPROVED SIGNATURE	DATE
Initiator: Renee Nordeen		July 7, 2009
START PL: Renee Nordeen		July 7, 2009
EPA TM: Brandon Perkins		7/13/2009
EPA QA Officer: Gina Grepo-Grove		7/27/09

**B**

# Photographic Documentation

TULUKSAK RIVER  
Tuluksak, Alaska



Photo 1 Location TR01SD.

*Direction: South Date: 9/16/08 Time: 11:55 Taken By: BM*



Photo 3 Location TR03SD.

*Direction: Northeast Date: 9/16/08 Time: 12:27 Taken By: RN*

TDD Number: 08-02-0017

Photographed by: Renee Nordeen (RN), Blythe Mackey (BM)



Photo 2 Location TR02SD.

*Direction: Southwest Date: 9/16/08 Time: 12:10 Taken By: BM*

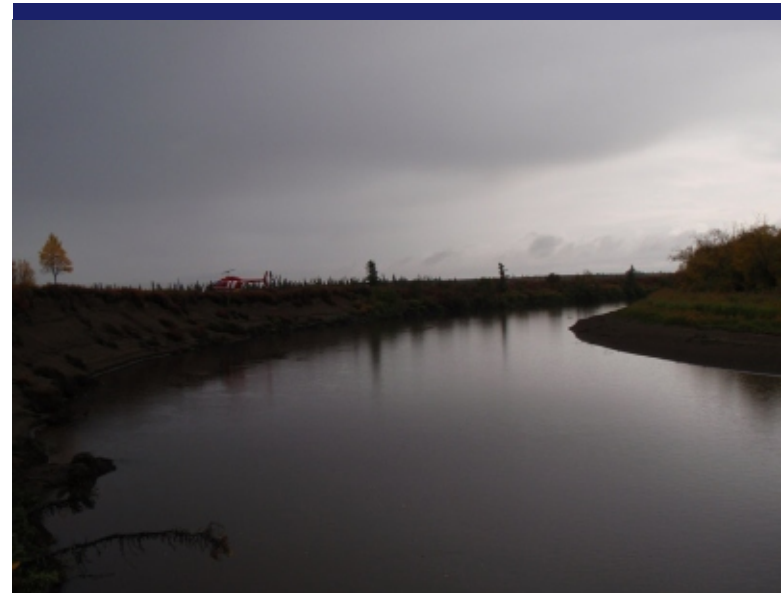


Photo 4 River upgradient of TR03SD.

*Direction: Northeast Date: 9/16/08 Time: 12:27 Taken By: RN*



TULUKSAK RIVER  
Tuluksak, Alaska



Photo 5 Location TR04SD with Fog River in background.

Direction: Northeast Date: 9/16/08 Time: 12:40 Taken By: BM



Photo 7 Location TR05SD.

Direction: Date: 9/16/08 Time: 12:50 Taken By: RN

TDD Number: 08-02-0017

Photographed by: Renee Nordeen (RN), Blythe Mackey (BM)



Photo 6 Location FR01SD with Tuluksak River in background.

Direction: East Date: 9/16/08 Time: 12:47 Taken By: RN



Photo 8 Fish camp with weir.

Direction: Down Date: 9/16/08 Time: 13:00 Taken By: RN



TULUKSAK RIVER  
Tuluksak, Alaska



Photo 9 Location TR06SD.

*Direction: West Date: 9/16/08 Time: 13:05 Taken By: RN*



Photo 11 Location TR08SD.

*Direction: Date: 9/16/08 Time: 13:25 Taken By: RN*

TDD Number: 08-02-0017

Photographed by: Renee Nordeen (RN), Blythe Mackey (BM)



Photo 10 Location TR07SD.

*Direction: North Date: 9/16/08 Time: 13:15 Taken By: RN*



Photo 12 Location TR09SD.

*Direction: Date: 9/16/08 Time: 14:10 Taken By: RN*



TULUKSAK RIVER  
Tuluksak, Alaska

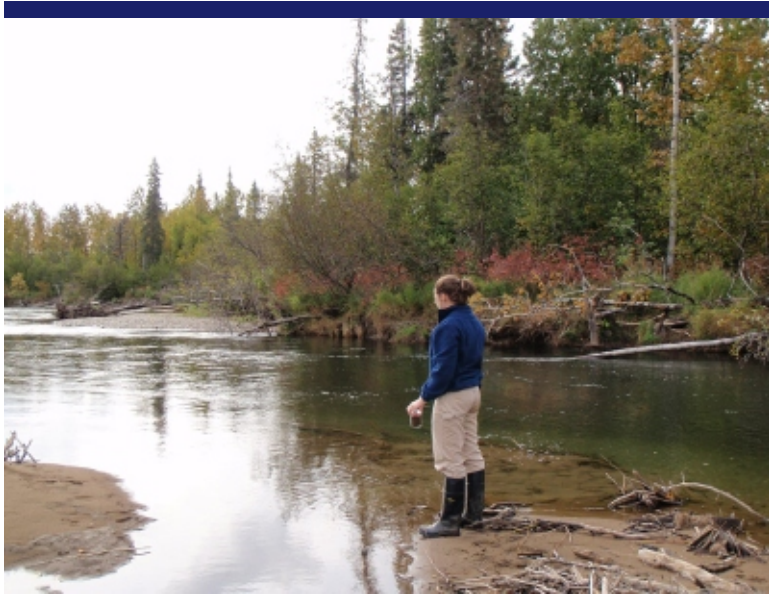


Photo 13 Location TR10SD.

Direction: Date: 9/16/08 Time: 14:20 Taken By: RN



Photo 15 Location TR12SD.

Direction: Date: 9/16/08 Time: 14:40 Taken By: RN

TDD Number: 08-02-0017

Photographed by: Renee Nordeen (RN), Blythe Mackey (BM)



Photo 14 Location TR11SD.

Direction: Date: 9/16/08 Time: 14:30 Taken By: RN



Photo 16 Location TR13SD.

Direction: Date: 9/16/08 Time: 14:50 Taken By: RN



TULUKSAK RIVER  
Tuluksak, Alaska



Photo 17 Location TR14SD where two channels meet.

Direction: Date: 9/16/08 Time: 15:00 Taken By: RN



Photo 19 Location GC01SO.

Direction: North Date: 9/16/08 Time: 16:30 Taken By: RN

TDD Number: 08-02-0017

Photographed by: Renee Nordeen (RN), Blythe Mackey (BM)



Photo 18 Location BG01SD on GC.

Direction: Date: 9/16/08 Time: 16:15 Taken By: RN



Photo 20 Location GC02SO.

Direction: Date: 9/16/08 Time: 16:32 Taken By: RN



TULUKSAK RIVER  
Tuluksak, Alaska



Photo 21 Location GC03SO.

Direction: Date: 9/16/08 Time: 16:37 Taken By: RN



Photo 23 Location DS01SO.

Direction: Date: 9/17/08 Time: 11:06 Taken By: RN

TDD Number: 08-02-0017  
Photographed by: Renee Nordeen (RN), Blythe Mackey (BM)



Photo 22 Location TR15SD.

Direction: Date: 9/17/08 Time: 10:50 Taken By: RN



Photo 24 Location DS02SO.

Direction: Date: 9/17/08 Time: 11:51 Taken By: RN



TULUKSAK RIVER  
Tuluksak, Alaska



Photo 25 Location TR16SD.

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Direction: Date: 9/17/08 Time: 12:25 Taken By: RN

---



Photo 27 Location TR17SD.

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Direction: Date: 9/17/08 Time: 13:18 Taken By: RN

---

TDD Number: 08-02-0017

Photographed by: Renee Nordeen (RN), Blythe Mackey (BM)



Photo 26 Location DS03SO.

---

Direction: Date: 9/17/08 Time: 12:43 Taken By: RN

---



Photo 28 Location TR18SD.

---

Direction: Date: 9/17/08 Time: 14:11 Taken By: BM

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TULUKSAK RIVER  
Tuluksak, Alaska



Photo 29 Location WS01SO, WS02SO, and WS03SO.

*Direction:* *Date: 9/17/08* *Time: 15:20* *Taken By: RN*



Photo 31 Location BC01SD.

*Direction:* *Date: 9/17/08* *Time: 17:33* *Taken By: RN*

TDD Number: 08-02-0017

Photographed by: Renee Nordeen (RN), Blythe Mackey (BM)



Photo 30 Location BG02SD.

*Direction:* *Date: 9/17/08* *Time: 16:18* *Taken By: RN*

# C

## Chain-of-Custody Documentation

# USEPA Contract Laboratory Program Inorganic Traffic Report & Chain of Custody Record

Reference Case: 37825

Client No:

R

Region: 10	Date Shipped: 9/22/2008	<b>Chain of Custody Record</b> Relinquished By (Date/Time) Received By (Date/Time) 1 <u>Rivard 9/22/08/1200</u> 2 3 4	Sampler Signature: <u>[Signature]</u>
Project Code: TEC-932A	Carrier Name: FedEx		
Account Code:	Airbill: 8667 8761 3850		
CERCLIS ID:	Shipped to: ChemTech Consulting Group (CHEM) 284 Sheffield Street Mountainside NJ 07092		
Spill ID: ZZ			
Site Name / City/State: Tuluksak River NYAC, AK			
Project Leader: Mark Woodke			
Action: Listing Site Inspection			
Sampling Co: Ecology and Environment, Inv.			

INORGANIC SAMPLE No.	MATRIX/ SAMPLER	TYPE	ANALYSIS/ TURNAROUND	TAG No./ PRESERVATIVE/Bottles	SAMPLING LOCATION	SAMPLE COLLECT DATE/TIME	QC Type
MJAA55	Sediment/ Blythe Mackey	G	TM (21)	08384200 (Ice Only) (1)	TR01SD	S: 09/16/2008 11:52	-
MJAA56	Sediment/ Blythe Mackey	G	TM (21)	08384201 (Ice Only) (1)	TR02SD	S: 09/16/2008 12:12	-
MJAA57	Sediment/ Blythe Mackey	G	TM (21)	08384202 (Ice Only) (1)	TR03SD	S: 09/16/2008 12:27	-
MJAA58	Sediment/ Blythe Mackey	G	TM (21)	08384203 (Ice Only) (1)	TR04SD	S: 09/16/2008 12:45	-
MJAA59	Sediment/ Blythe Mackey	G	TM (21)	08384204 (Ice Only) (1)	TR05SD	S: 09/16/2008 12:50	-
MJAA60	Sediment/ Blythe Mackey	G	TM (21)	08384205 (Ice Only) (1)	TR06SD	S: 09/16/2008 13:05	-

Shipment for Case Complete? Y	Sample (s) to be used for laboratory QC:	Additional Sampler Signature (s):	Chain Of Custody Seal Number :
Analysis Key:	Concentration : L = Low, M = Medium, H = High, L/M = Low/Medium	Type/Designate : Composite = C, Grab = G, Both = B	Shipment Iced? _____
TM = CLP TAL Total Metals			

COC Number : 10-4097213-092208-0001

PR provides preliminary results. Requests for preliminary results will increase analytical costs.

FORMS II Lite Help Desk, CSC, 15000 Conference Center Dr., Chantilly, VA 20151-3819; Phone 703/818-4200; Fax 703/818-4602; e-Mail f2lite@fedcsc.com


REGION COPY

# USEPA Contract Laboratory Program Inorganic Traffic Report & Chain of Custody Record

Reference Case: 37825

Client No:

R

Region: 10	Date Shipped: 9/22/2008	Chain of Custody Record	Sampler Signature: 
Project Code: TEC-932A	Carrier Name: FedEx		
Account Code:	Airbill: 8667 8761 3850	Relinquished By (Date/Time)	Received By (Date/Time)
CERCLIS ID:	Shipped to: ChemTech Consulting Group (CHEM) 284 Sheffield Street Mountainside NJ 07092	1 <u>R. Prude 9/22/08/12:00</u>	
Spill ID: ZZ		2	
Site Name / City/State: Tuluksak River NYAC, AK		3	
Project Leader: Mark Woodke		4	
Action: Listing Site Inspection			
Sampling Co: Ecology and Environment, Inv.			

INORGANIC SAMPLE No.	MATRIX/ SAMPLER	TYPE	ANALYSIS/ TURNAROUND	TAG No./ PRESERVATIVE/Bottles	SAMPLING LOCATION	SAMPLE COLLECT DATE/TIME	QC Type
MJAA61	Sediment/ Blythe Mackey	G	TM (21)	08384206 (Ice Only) (1)	TR07SD	S: 09/16/2008 13:15	--
MJAA62	Sediment/ Blythe Mackey	G	TM (21)	08384207 (Ice Only) (1)	TR08SD	S: 09/16/2008 13:25	--
MJAA63	Sediment/ Blythe Mackey	G	TM (21)	08384208 (Ice Only) (1)	TR09SD	S: 09/16/2008 14:10	Field SampleUJ
MJAA64	Sediment/ Blythe Mackey	G	TM (21)	08384209 (Ice Only) (1)	TR10SD	S: 09/16/2008 14:20	--
MJAA65	Sediment/ Blythe Mackey	G	TM (21)	08384210 (Ice Only) (1)	TR11SD	S: 09/16/2008 14:30	--
MJAA66	Sediment/ Blythe Mackey	G	TM (21)	08384211 (Ice Only) (1)	TR12SD	S: 09/16/2008 14:40	--

Shipment for Case Complete? Y	Sample (s) to be used for laboratory QC:	Additional Sampler Signature (s):	Chain Of Custody Seal Number :
Analysis Key:	Concentration : L = Low, M = Medium, H = High, L/M = Low/Medium	Type/Designate : Composite = C, Grab = G, Both = B	Shipment Iced? _____
TM = CLP TAL Total Metals			

COC Number : 10-4097213-092208-0001

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# USEPA Contract Laboratory Program Inorganic Traffic Report & Chain of Custody Record

Reference Case: 37825

Client No:

R

Region: 10	Date Shipped: 9/22/2008	Chain of Custody Record	Sampler Signature: <i>Blythe Mackey</i>
Project Code: TEC-932A	Carrier Name: FedEx		
Account Code:	Airbill: 8667 8761 3850	Relinquished By (Date/Time)	Received By (Date/Time)
CERCLIS ID:	Shipped to: ChemTech Consulting Group (CHEM) 284 Sheffield Street Mountainside NJ 07092	<i>Riviera 9/22/08/1200</i>	
Spill ID: ZZ		2	
Site Name / City/State: Tuluksak River NYAC, AK		3	
Project Leader: Mark Woodke		4	
Action: Listing Site Inspection			
Sampling Co: Ecology and Environment, Inv.			

INORGANIC SAMPLE No.	MATRIX/ SAMPLER	TYPE	ANALYSIS/ TURNAROUND	TAG No./ PRESERVATIVE/Bottles	SAMPLING LOCATION	SAMPLE COLLECT DATE/TIME	QC Type
MJAA67	Sediment/ Blythe Mackey	G	TM (21)	08384212 (Ice Only) (1)	TR13SD	S: 09/16/2008 14:50	-
MJAA68	Sediment/ Blythe Mackey	G	TM (21)	08384213 (Ice Only) (1)	TR14SD	S: 09/16/2008 15:00	-
MJAA69	Sediment/ Blythe Mackey	G	TM (21)	08384214 (Ice Only) (1)	TR15SD	S: 09/17/2008 09:50	-
MJAA70	Sediment/ Blythe Mackey	G	TM (21)	08384215 (Ice Only) (1)	TR16SD	S: 09/17/2008 12:30	-
MJAA71	Sediment/ Blythe Mackey	G	TM (21)	08384216 (Ice Only) (1)	TR17SD	S: 09/17/2008 13:15	-
MJAA72	Sediment/ Blythe Mackey	G	TM (21)	08384217 (Ice Only) (1)	TR18SD	S: 09/17/2008 14:20	-

Shipment for Case Complete? Y	Sample (s) to be used for laboratory QC:	Additional Sampler Signature (s):	Chain Of Custody Seal Number :
Analysis Key:	Concentration : L = Low, M = Medium, H = High, L/M = Low/Medium	Type/Designate : Composite = C, Grab = G, Both = B	Shipment Iced? _____
TM = CLP TAL Total Metals			

COC Number : 10-4097213-092208-0001

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FORMS II Lite Help Desk, CSC, 15000 Conference Center Dr., Chantilly, VA 20151-3819; Phone 703/818-4200; Fax 703/818-4602; e-Mail f2lite@fedcsc.com

# USEPA Contract Laboratory Program Inorganic Traffic Report & Chain of Custody Record

Reference Case: 37825

Client No:

R

Region: 10	Date Shipped: 9/22/2008	Chain of Custody Record	Sampler Signature: <i>[Signature]</i>
Project Code: TEC-932A	Carrier Name: FedEx		
Account Code:	Airbill: 8667 8761 3850	Relinquished By (Date/Time)	Received By (Date/Time)
CERCLIS ID:	Shipped to: ChemTech Consulting Group (CHEM) 284 Sheffield Street Mountainside NJ 07092	1 <i>Blythe</i> 9/22/08/12:00	
Spill ID: ZZ		2	
Site Name / City/State: Tuluksak River NYAC, AK		3	
Project Leader: Mark Woodke		4	
Action: Listing Site Inspection			
Sampling Co: Ecology and Environment, Inv.			

INORGANIC SAMPLE No.	MATRIX/ SAMPLER	TYPE	ANALYSIS/ TURNAROUND	TAG No./ PRESERVATIVE/Bottles	SAMPLING LOCATION	SAMPLE COLLECT DATE/TIME	QC Type
MJAA83	Sediment/ Blythe Mackey	G	TM (21)	08384228 (Ice Only) (1)	FR01SD	S: 09/16/2008 12:47	-
MJAA84	Surface Soil/ Blythe Mackey	G	TM (21)	08384229 (Ice Only) (1)	GC01SO	S: 09/16/2008 16:30	-
MJAA85	Surface Soil/ Blythe Mackey	G	TM (21)	08384230 (Ice Only) (1)	GC02SO	S: 09/16/2008 16:33	-
MJAA86	Surface Soil/ Blythe Mackey	G	TM (21)	08384231 (Ice Only) (1)	GC03SO	S: 09/16/2008 16:38	-
MJAA87	Sediment/ Blythe Mackey	G	TM (21)	08384232 (Ice Only) (1)	GC04SD	S: 09/16/2008 16:45	-
MJAA95	Sediment/ Blythe Mackey	G	TM (21)	08384240 (Ice Only) (1)	TP01SD	S: 09/17/2008 16:50	-

Shipment for Case Complete? Y	Sample (s) to be used for laboratory QC:	Additional Sampler Signature (s):	Chain Of Custody Seal Number :
Analysis Key:	Concentration : L = Low, M = Medium, H = High, L/M = Low/Medium	Type/Designate : Composite = C, Grab = G, Both = B	Shipment Iced? _____
TM = CLP TAL Total Metals			

COC Number : 10-4097213-092208-0001

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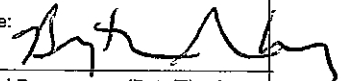
FORMS II Lite Help Desk, CSC, 15000 Conference Center Dr., Chantilly, VA 20151-3819; Phone 703/818-4200; Fax 703/818-4502; e-Mail f2lite@fedcsc.com

# USEPA Contract Laboratory Program Inorganic Traffic Report & Chain of Custody Record

Reference Case: 37825

Client No:

**R**

Region: 10	Date Shipped: 9/22/2008	Chain of Custody Record	Sampler Signature: 
Project Code: TEC-932A	Carrier Name: FedEx		
Account Code:	Airbill: 8667 8761 3850	Relinquished By (Date/Time)	Received By (Date/Time)
CERCLIS ID:	Shipped to: ChemTech Consulting Group (CHEM) 284 Sheffield Street Mountainside NJ 07092	1 <u>Blythe 9/22/08/1200</u>	
Spill ID: ZZ		2	
Site Name / City/State: Tuluksak River NYAC, AK		3	
Project Leader: Mark Woodke		4	
Action: Listing Site Inspection			
Sampling Co: Ecology and Environment, Inv.			

INORGANIC SAMPLE No.	MATRIX/ SAMPLER	TYPE	ANALYSIS/ TURNAROUND	TAG No./ PRESERVATIVE/Bottles	SAMPLING LOCATION	SAMPLE COLLECT DATE/TIME	QC Type
MJAA96	Surface Soil/ Blythe Mackey	G	TM (21)	08384241 (Ice Only) (1)	WS01SO	S: 09/17/2008 15:10	--
MJAA97	Surface Soil/ Blythe Mackey	G	TM (21)	08384242 (Ice Only) (1)	WS02SO	S: 09/17/2008 15:12	--
MJAA98	Surface Soil/ Blythe Mackey	G	TM (21)	08384243 (Ice Only) (1)	WS03SO	S: 09/17/2008 15:15	--
MJAAB6	Surface Soil/ Blythe Mackey	G	TM (21)	08384261 (Ice Only) (1)	DS01SO	S: 09/17/2008 11:05	--
MJAAB7	Surface Soil/ Blythe Mackey	G	TM (21)	08384262 (Ice Only) (1)	DS02SO	S: 09/17/2008 11:50	--
MJAAB8	Surface Soil/ Blythe Mackey	G	TM (21)	08384263 (Ice Only) (1)	DS03SO	S: 09/17/2008 12:40	--

Shipment for Case Complete? Y	Sample (s) to be used for laboratory QC:	Additional Sampler Signature (s):	Chain Of Custody Seal Number :
Analysis Key:	Concentration : L = Low, M = Medium, H = High, L/M = Low/Medium	Type/Designate : Composite = C, Grab = G, Both = B	Shipment Iced? _____
TM = CLP TAL Total Metals			

**COC Number : 10-4097213-092208-0001**

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FORMS II Lite Help Desk, CSC, 15000 Conference Center Dr., Chantilly, VA 20151-3819; Phone 703/818-4200; Fax 703/818-4602; e-Mail f2lite@fedcsc.com

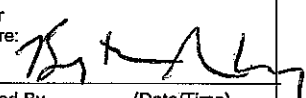

REGION COP

# USEPA Contract Laboratory Program Inorganic Traffic Report & Chain of Custody Record

Reference Case: 37825

Client No:

R

Region: 10	Date Shipped: 9/22/2008	Chain of Custody Record	Sampler Signature: 
Project Code: TEC-932A	Carrier Name: FedEx		
Account Code:	Airbill: 8667 8761 3850	Relinquished By (Date/Time)	Received By (Date/Time)
CERCLIS ID:	Shipped to: ChemTech Consulting Group (CHEM) 284 Sheffield Street Mountainside NJ 07092	1  9/22/08/12:00	
Spill ID: ZZ		2	
Site Name / City/State: Tuluksak River NYAC, AK		3	
Project Leader: Mark Woodke		4	
Action: Listing Site Inspection			
Sampling Co: Ecology and Environment, Inv.			

INORGANIC SAMPLE No.	MATRIX/ SAMPLER	TYPE	ANALYSIS/ TURNAROUND	TAG No./ PRESERVATIVE/Bottles	SAMPLING LOCATION	SAMPLE COLLECT DATE/TIME	QC Type
MJAAF6	Sediment/ Blythe Mackey	G	TM (21)	08384301 (Ice Only) (1)	BG01SD	S: 09/16/2008 16:15	-
MJAAF7	Sediment/ Blythe Mackey	G	TM (21)	08384302 (Ice Only) (1)	BG02SD	S: 09/17/2008 16:10	-
MJAAF8	Sediment/ Blythe Mackey	G	TM (21)	08384303 (Ice Only) (1)	BC01SD	S: 09/17/2008 17:40	-

Shipment for Case Complete? Y	Sample (s) to be used for laboratory QC: MJAAF6, MJAAF7	Additional Sampler Signature (s):	Chain Of Custody Seal Number :
Analysis Key:	Concentration : L = Low, M = Medium, H = High, L/M = Low/Medium	Type/Designate : Composite = C, Grab = G, Both = B	Shipment Iced? _____
TM = CLP TAL Total Metals			

COC Number : 10-4097213-092208-0001

PR provides preliminary results. Requests for preliminary results will increase analytical costs.

FORMS II Lite Help Desk, CSC, 15000 Conference Center Dr., Chantilly, VA 20151-3819; Phone 703/818-4200; Fax 703/818-4602; e-Mail f2lite@fedcsc.com

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# D

## Global Positioning System Coordinates

**GPS Coordinates**

EPA Sample ID	Station Location	CLP Sample ID	Latitude (Degrees North)	Longitude (Degrees West)
08384200	TR01SD	MJAA55	61° 06.01'	160° 53.60'
08384201	TR02SD	MJAA56	61° 07.07'	160° 50.61'
08384202	TR03SD	MJAA57	61° 06.44'	160° 44.75'
08384203	TR04SD	MJAA58	Not Recorded	Not Recorded
08384204	TR05SD	MJAA59	61° 04.00'	160° 37.25'
08384205	TR06SD	MJAA60	61° 00.86'	160° 34.55'
08384206	TR07SD	MJAA61	60° 55.56'	160° 31.59'
08384207	TR08SD	MJAA62	60° 57.84'	160° 28.30'
08384208	TR09SD	MJAA63	60° 57.79'	160° 24.26'
08384209	TR10SD	MJAA64	60° 57.53'	160° 20.91'
08384210	TR11SD	MJAA65	60° 57.17'	160° 16.91'
08384211	TR12SD	MJAA66	60° 57.97'	160° 12.97'
08384212	TR13SD	MJAA67	60° 57.90'	160° 12.97'
08384213	TR14SD	MJAA68	60° 58.35'	160° 5.68'
08384214	TR15SD	MJAA69	60° 58' 43.114"	160° 4 26.248"
08384215	TR16SD	MJAA70	60° 59' 31.309"	159° 58" 47.006"
08384216	TR17SD	MJAA71	61° 2' 07.010"	159° 56" 14.887"
08384217	TR18SD	MJAA72	61° 3' 13.722"	159° 56' 09.333"
08384228	FR01SD	MJAA83	61° 04.65'	160° 41.03'
08384229	GC01SO	MJAA84	60° 58.81'	160° 5.53'
08384230	GC02SO	MJAA85	60° 58.81'	160° 5.53'
08384231	GC03SO	MJAA86	60° 58.81'	160° 5.53'
08384232	GC04SD	MJAA87	60° 58.81'	160° 5.53'
08384240	TP01SD	MJAA95	61° 03' 07.485"	159° 47' 47.721"
08384241	WS01SO	MJAA96	61° 01' 22.710"	159° 50' 32.453"
08384242	WS02SO	MJAA97	61° 01' 22.710"	159° 50' 32.453"
08384243	WS03SO	MJAA98	61° 01' 22.710"	159° 50' 32.453"
08384261	DS01SO	MJAAB6	60° 58' 44.365'	160° 04' 23.416"
08384262	DS02SO	MJAAB7	60° 59' 1.787'	160° 1' 57.670"
08384263	DS03SO	MJAAB8	60° 59' 22.949'	159° 58' 41.443"
08384301	BG01SD	MJAAF6	60° 59.67'	160° 5.51'
08384302	BG02SD	MJAAF7	61° 05' 25.155"	159° 43' 37.742"
08384303	BC01SD	MJAAF8	61° 00' 36.269'	159° 54' 1.799"

Key:

CLP = Contract Laboratory Program.

EPA = United States Environmental Protection Agency.

ID = Identification.





# Data Validation Memoranda



# ecology and environment, inc.

International Specialists in the Environment

720 Third Avenue, Suite 1700, Seattle, WA 98104  
Tel: (206) 624-9537, Fax: (206) 621-9832

## MEMORANDUM

DATE: January 9, 2009  
TO: Mark Woodke, Project Manager, E & E, Seattle, Washington  
FROM: ~~for~~ Bryan Vasser, START-3 Chemist, E & E, Seattle, Washington *mu*  
SUBJ: Data Summary Check, Tuluksak River Site,  
Tuluksak, Alaska  
REF: TDD: 08-02-0017 PAN: 002233.0324.01SI

The data summary check of 20 sediment/soil samples collected from the Tuluksak River site in Tuluksak, Alaska, has been completed. Mercury analyses (EPA CLP SOW ILM05.4) were performed by Chemtech, Mountainside, New Jersey.

The samples were numbered:

MJAA55	MJAA56	MJAA57	MJAA58	MJAA59	MJAA60
MJAA61	MJAA62	MJAA63	MJAA64	MJAA65	MJAA66
MJAA67	MJAA68	MJAA69	MJAA70	MJAA71	MJAA72
MJAA83	MJAAP6				

No discrepancies were noted. The secondary reviewer reapplied the "J" (estimated quantity) qualifier back to results that were originally qualified "J" by the laboratory when deleted by the primary reviewer.



UNITED STATES ENVIRONMENTAL PROTECTION AGENCY  
REGION 10  
1200 Sixth Avenue, Suite 900  
Seattle, Washington 98101

November 24, 2008

Reply To  
Attn. Of: OEA-095

MEMORANDUM

SUBJECT: Data Validation for Tuluksak River SI,  
Case# 37825, SDG: MJAA56, Mercury Analyses

FROM: Jennifer Crawford, Chemist *JL*  
Environmental Services Unit, OEA

TO: Brandon Perkins, Site Assessment Manager  
Office of Environmental Cleanup (ECL-112)

CC: Renee Nordeen, Ecology & Environment

The data validation of inorganic analyses for the above sample set is complete. Twenty (20) soil samples were analyzed for mercury (CVAA) by Chemtech Laboratory, Mountainside, NJ. Sample numbers for this delivery group are:

MJAA55	MJAA56	MJAA57	MJAA58	MJAA59	MJAA60	MJAA61
MJAA62	MJAA63	MJAA64	MJAA65	MJAA66	MJAA67	MJAA68
MJAA69	MJAA70	MJAA71	MJAA72	MJAA83	MJAAF6	

**DATA QUALIFICATIONS**

The following comments refer to the lab's performance in meeting the specifications outlined in the "CLP Statement of Work (CLP-SOW) for Inorganic Analysis, rev. ILM05.4", the "USEPA CLP National Functional Guidelines for Inorganic Data Review" and the judgment of the reviewer. The comments presented herein are based on the information provided for the review.

**TIMELINESS - Acceptable**

No technical holding time requirements have been established for mercury in solid matrices. Samples were collected on 09/16/2008 and 09/17/2008. Mercury analysis (CV-AAS) was conducted on 10/23/2008.

**INSTRUMENT CALIBRATION/VERIFICATION - Acceptable**

A blank and five standards were analyzed for instrument calibration.



The correlation coefficient (0.9999) was within the linearity criterion ( $\geq 0.995$ ). Recoveries for verification standards (96-103%) met the frequency (10%) and recovery (80-120%) criteria.

Quantitation verification standards met both the frequency and recovery criteria for all analytes.

#### **LABORATORY CONTROL SAMPLES (LCS) - Acceptable**

Analyte recoveries for the LCS were within the established control limits for solid samples.

#### **BLANKS - Acceptable**

Preparation and instrument control blanks were prepared and analyzed in accordance with method requirements. Detected blank results were below the quantitation limit.

#### **MATRIX SPIKE ANALYSIS - Acceptable**

A matrix spike analysis was performed for sample MJAAF6. Percent recovery was within the recovery criterion (75-125%).

#### **DUPLICATE SAMPLE ANALYSIS - Acceptable**

A duplicate sample analysis was performed for sample MJAAF6. Relative percent difference (RPD) was not calculated for the duplicate sample analysis, as both native and duplicate had non-detect results.

#### **ASSESSMENT SUMMARY**

The following is a summary of qualified data:

Samples MJAA64 and MJAAF6 were qualified (UJL) due to both having a negative result slightly less than the negative CRQL. Values for these samples may be biased low.

Sample results above the lab MDL and below the CRQL were qualified (Q).

#### **DATA QUALIFIERS**

- U - The material was analyzed for, but was not detected above the level of the associated value. The associated value is either the sample quantitation limit or the sample detection limit.
- J - The associated value is an estimated quantity.
- R - The data are unusable. The analyte may or may not be present in the sample.
- UJ - The analyte was analyzed for, but was not detected. The associated value is an estimate and may be inaccurate or imprecise.





PROJECT SPECIFIC DATA QUALIFIERS:

- L - Low bias.
- H - High bias.
- K - Unknown Bias.
- Q - Detected concentration is below the method reporting limit / Contract Required Quantitation Limit, but is above the method detection limit.

## USEPA - CLP

1A-IN  
INORGANIC ANALYSIS DATA SHEET

EPA SAMPLE NO.

MJAA55

Lab Name: CHEMTECH CONSULTING GROUP Contract: EPW06047Lab Code: CHEM Case No.: 37825 NRAS No.: \_\_\_\_\_ SDG No.: MJAA56Matrix: (soil/water) SOIL Lab Sample ID: Z5072-02Level: (low/med) LOW Date Received: 09/24/2008% Solids: 49.0 50.0% (pg 73)  
49.0% labelled incorrectly  
Concentration Units (ug/L or mg/kg dry weight): MG/KG

CAS No.	Analyte	Concentration	C	Q	M
7429-90-5	Aluminum				NR
7440-36-0	Antimony				NR
7440-38-2	Arsenic				NR
7440-39-3	Barium				NR
7440-41-7	Beryllium				NR
7440-43-9	Cadmium				NR
7440-70-2	Calcium				NR
7440-47-3	Chromium				NR
7440-48-4	Cobalt				NR
7440-50-8	Copper				NR
7439-89-6	Iron				NR
7439-92-1	Lead				NR
7439-95-4	Magnesium				NR
7439-96-5	Manganese				NR
7439-97-6	Mercury	0.20 ✓			CV
7440-02-0	Nickel				NR
7440-09-7	Potassium				NR
7782-49-2	Selenium				NR
7440-22-4	Silver				NR
7440-23-5	Sodium				NR
7440-28-0	Thallium				NR
7440-62-2	Vanadium				NR
7440-66-6	Zinc				NR
57-12-5	Cyanide				NR

Color Before: BROWN Clarity Before: \_\_\_\_\_ Texture: MEDIUMColor After: YELLOW Clarity After: \_\_\_\_\_ Artifacts: \_\_\_\_\_

Comments:

## USEPA - CLP

1A-IN  
INORGANIC ANALYSIS DATA SHEET

EPA SAMPLE NO.

MJAA56

Lab Name: CHEMTECH CONSULTING GROUP Contract: EPW06047Lab Code: CHEM Case No.: 37825 NRAS No.: \_\_\_\_\_ SDG No.: MJAA56Matrix: (soil/water) SOIL Lab Sample ID: Z5072-01Level: (low/med) LOW Date Received: 09/24/2008% Solids: 50.0Concentration Units (ug/L or mg/kg dry weight): MG/KG

CAS No.	Analyte	Concentration	C	Q	M
7429-90-5	Aluminum				NR
7440-36-0	Antimony				NR
7440-38-2	Arsenic				NR
7440-39-3	Barium				NR
7440-41-7	Beryllium				NR
7440-43-9	Cadmium				NR
7440-70-2	Calcium				NR
7440-47-3	Chromium				NR
7440-48-4	Cobalt				NR
7440-50-8	Copper				NR
7439-89-6	Iron				NR
7439-92-1	Lead				NR
7439-95-4	Magnesium				NR
7439-96-5	Manganese				NR
7439-97-6	Mercury	0.20	U	✓	CV
7440-02-0	Nickel				NR
7440-09-7	Potassium				NR
7782-49-2	Selenium				NR
7440-22-4	Silver				NR
7440-23-5	Sodium				NR
7440-28-0	Thallium				NR
7440-62-2	Vanadium				NR
7440-66-6	Zinc				NR
57-12-5	Cyanide				NR

Color Before: BROWN

Clarity Before: \_\_\_\_\_

Texture: MEDIUMColor After: YELLOW

Clarity After: \_\_\_\_\_

Artifacts: \_\_\_\_\_

Comments:

## USEPA - CLP

1A-IN  
INORGANIC ANALYSIS DATA SHEET

EPA SAMPLE NO.

MJAA57

Lab Name: CHEMTECH CONSULTING GROUP Contract: EPW06047Lab Code: CHEM Case No.: 37825 NRAS No.: \_\_\_\_\_ SDG No.: MJAA56Matrix: (soil/water) SOIL Lab Sample ID: Z5072-03Level: (low/med) LOW Date Received: 09/24/2008% Solids: 78.5Concentration Units (ug/L or mg/kg dry weight): MG/KG

CAS No.	Analyte	Concentration	C	Q	M
7429-90-5	Aluminum				NR
7440-36-0	Antimony				NR
7440-38-2	Arsenic				NR
7440-39-3	Barium				NR
7440-41-7	Beryllium				NR
7440-43-9	Cadmium				NR
7440-70-2	Calcium				NR
7440-47-3	Chromium				NR
7440-48-4	Cobalt				NR
7440-50-8	Copper				NR
7439-89-6	Iron				NR
7439-92-1	Lead				NR
7439-95-4	Magnesium				NR
7439-96-5	Manganese				NR
7439-97-6	Mercury	0.12	U	✓	CV
7440-02-0	Nickel				NR
7440-09-7	Potassium				NR
7782-49-2	Selenium				NR
7440-22-4	Silver				NR
7440-23-5	Sodium				NR
7440-28-0	Thallium				NR
7440-62-2	Vanadium				NR
7440-66-6	Zinc				NR
57-12-5	Cyanide				NR

Color Before: BROWN Clarity Before: \_\_\_\_\_ Texture: MEDIUMColor After: YELLOW Clarity After: \_\_\_\_\_ Artifacts: \_\_\_\_\_

Comments:

ju 11/21/08

## USEPA - CLP

1A-IN  
INORGANIC ANALYSIS DATA SHEET

EPA SAMPLE NO.

MJAA58

Lab Name: CHEMTECH CONSULTING GROUP Contract: EPW06047Lab Code: CHEM Case No.: 37825 NRAS No.: \_\_\_\_\_ SDG No.: MJAA56Matrix: (soil/water) SOIL Lab Sample ID: Z5072-04Level: (low/med) LOW Date Received: 09/24/2008% Solids: 52.1Concentration Units (ug/L or mg/kg dry weight): MG/KG

CAS No.	Analyte	Concentration	C	Q	M
7429-90-5	Aluminum				NR
7440-36-0	Antimony				NR
7440-38-2	Arsenic				NR
7440-39-3	Barium				NR
7440-41-7	Beryllium				NR
7440-43-9	Cadmium				NR
7440-70-2	Calcium				NR
7440-47-3	Chromium				NR
7440-48-4	Cobalt				NR
7440-50-8	Copper				NR
7439-89-6	Iron				NR
7439-92-1	Lead				NR
7439-95-4	Magnesium				NR
7439-96-5	Manganese				NR
7439-97-6	Mercury	0.18 ✓	U		CV
7440-02-0	Nickel				NR
7440-09-7	Potassium				NR
7782-49-2	Selenium				NR
7440-22-4	Silver				NR
7440-23-5	Sodium				NR
7440-28-0	Thallium				NR
7440-62-2	Vanadium				NR
7440-66-6	Zinc				NR
57-12-5	Cyanide				NR

Color Before: BROWN

Clarity Before: \_\_\_\_\_

Texture: MEDIUMColor After: YELLOW

Clarity After: \_\_\_\_\_

Artifacts: \_\_\_\_\_

Comments:

09/21/08

## USEPA - CLP

1A-IN  
INORGANIC ANALYSIS DATA SHEET

EPA SAMPLE NO.

MJAA59

Lab Name: CHEMTECH CONSULTING GROUP Contract: EPW06047Lab Code: CHEM Case No.: 37825 NRAS No.: \_\_\_\_\_ SDG No.: MJAA56Matrix: (soil/water) SOIL Lab Sample ID: Z5072-05Level: (low/med) LOW Date Received: 09/24/2008% Solids: 67.7Concentration Units (ug/L or mg/kg dry weight): MG/KG

CAS No.	Analyte	Concentration	C	Q	M
7429-90-5	Aluminum				NR
7440-36-0	Antimony				NR
7440-38-2	Arsenic				NR
7440-39-3	Barium				NR
7440-41-7	Beryllium				NR
7440-43-9	Cadmium				NR
7440-70-2	Calcium				NR
7440-47-3	Chromium				NR
7440-48-4	Cobalt				NR
7440-50-8	Copper				NR
7439-89-6	Iron				NR
7439-92-1	Lead				NR
7439-95-4	Magnesium				NR
7439-96-5	Manganese				NR
7439-97-6	Mercury	0.15	✓	U	CV
7440-02-0	Nickel				NR
7440-09-7	Potassium				NR
7782-49-2	Selenium				NR
7440-22-4	Silver				NR
7440-23-5	Sodium				NR
7440-28-0	Thallium				NR
7440-62-2	Vanadium				NR
7440-66-6	Zinc				NR
57-12-5	Cyanide				NR

Color Before: BROWN Clarity Before: \_\_\_\_\_ Texture: MEDIUMColor After: YELLOW Clarity After: \_\_\_\_\_ Artifacts: \_\_\_\_\_

Comments:

02 11/21/08



USEPA - CLP  
1A-IN  
INORGANIC ANALYSIS DATA SHEET

EPA SAMPLE NO.

MJAA60

Lab Name: CHEMTECH CONSULTING GROUP Contract: EPW06047

Lab Code: CHEM Case No.: 37825 NRAS No.: \_\_\_\_\_ SDG No.: MJAA56

Matrix: (soil/water) SOIL Lab Sample ID: Z5072-06

Level: (low/med) LOW Date Received: 09/24/2008

% Solids: 60.5

Concentration Units (ug/L or mg/kg dry weight): MG/KG

CAS No.	Analyte	Concentration	C	Q	M
7429-90-5	Aluminum				NR
7440-36-0	Antimony				NR
7440-38-2	Arsenic				NR
7440-39-3	Barium				NR
7440-41-7	Beryllium				NR
7440-43-9	Cadmium				NR
7440-70-2	Calcium				NR
7440-47-3	Chromium				NR
7440-48-4	Cobalt				NR
7440-50-8	Copper				NR
7439-89-6	Iron				NR
7439-92-1	Lead				NR
7439-95-4	Magnesium				NR
7439-96-5	Manganese				NR
7439-97-6	Mercury	0.15 ✓	U		CV
7440-02-0	Nickel				NR
7440-09-7	Potassium				NR
7782-49-2	Selenium				NR
7440-22-4	Silver				NR
7440-23-5	Sodium				NR
7440-28-0	Thallium				NR
7440-62-2	Vanadium				NR
7440-66-6	Zinc				NR
57-12-5	Cyanide				NR

Color Before: BROWN

Clarity Before: \_\_\_\_\_

Texture: MEDIUM

Color After: YELLOW

Clarity After: \_\_\_\_\_

Artifacts: \_\_\_\_\_

Comments:

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*22 11/2/08*

USEPA - CLP

1A-IN  
INORGANIC ANALYSIS DATA SHEET

EPA SAMPLE NO.

MJAA61

Lab Name: CHEMTECH CONSULTING GROUP Contract: EPW06047Lab Code: CHEM Case No.: 37825 NRAS No.: \_\_\_\_\_ SDG No.: MJAA56Matrix: (soil/water) SOIL Lab Sample ID: Z5072-07Level: (low/med) LOW Date Received: 09/24/2008% Solids: 75.0 ✓Concentration Units (ug/L or mg/kg dry weight): MG/KG

CAS No.	Analyte	Concentration	C	Q	M
7429-90-5	Aluminum				NR
7440-36-0	Antimony				NR
7440-38-2	Arsenic				NR
7440-39-3	Barium				NR
7440-41-7	Beryllium				NR
7440-43-9	Cadmium				NR
7440-70-2	Calcium				NR
7440-47-3	Chromium				NR
7440-48-4	Cobalt				NR
7440-50-8	Copper				NR
7439-89-6	Iron				NR
7439-92-1	Lead				NR
7439-95-4	Magnesium				NR
7439-96-5	Manganese				NR
7439-97-6	Mercury	0.13 ✓	U		CV
7440-02-0	Nickel				NR
7440-09-7	Potassium				NR
7782-49-2	Selenium				NR
7440-22-4	Silver				NR
7440-23-5	Sodium				NR
7440-28-0	Thallium				NR
7440-62-2	Vanadium				NR
7440-66-6	Zinc				NR
57-12-5	Cyanide				NR

Color Before: BROWN Clarity Before: \_\_\_\_\_ Texture: MEDIUMColor After: YELLOW Clarity After: \_\_\_\_\_ Artifacts: \_\_\_\_\_

Comments:

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USEPA - CLP  
IA-IN  
INORGANIC ANALYSIS DATA SHEET

EPA SAMPLE NO.

MJAA62

Lab Name: CHEMTECH CONSULTING GROUP Contract: EPW06047

Lab Code: CHEM Case No.: 37825 NRAS No.: \_\_\_\_\_ SDG No.: MJAA56

Matrix: (soil/water) SOIL Lab Sample ID: Z5072-08

Level: (low/med) LOW Date Received: 09/24/2008

% Solids: 71.9 ✓

Concentration Units (ug/L or mg/kg dry weight): MG/KG

CAS No.	Analyte	Concentration	C	Q	M
7429-90-5	Aluminum				NR
7440-36-0	Antimony				NR
7440-38-2	Arsenic				NR
7440-39-3	Barium				NR
7440-41-7	Beryllium				NR
7440-43-9	Cadmium				NR
7440-70-2	Calcium				NR
7440-47-3	Chromium				NR
7440-48-4	Cobalt				NR
7440-50-8	Copper				NR
7439-89-6	Iron				NR
7439-92-1	Lead				NR
7439-95-4	Magnesium				NR
7439-96-5	Manganese				NR
7439-97-6	Mercury	0.14 ✓	U		CV
7440-02-0	Nickel				NR
7440-09-7	Potassium				NR
7782-49-2	Selenium				NR
7440-22-4	Silver				NR
7440-23-5	Sodium				NR
7440-28-0	Thallium				NR
7440-62-2	Vanadium				NR
7440-66-6	Zinc				NR
57-12-5	Cyanide				NR

Color Before: BROWN

Clarity Before: \_\_\_\_\_

Texture: MEDIUM

Color After: YELLOW

Clarity After: \_\_\_\_\_

Artifacts: \_\_\_\_\_

Comments:

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## USEPA - CLP

IA-IN  
INORGANIC ANALYSIS DATA SHEET

EPA SAMPLE NO.

MJAA63

Lab Name: CHEMTECH CONSULTING GROUP Contract: EPW06047Lab Code: CHEM Case No.: 37825 NRAS No.: \_\_\_\_\_ SDG No.: MJAA56Matrix: (soil/water) SOIL Lab Sample ID: Z5072-09Level: (low/med) LOW Date Received: 09/24/2008% Solids: 75.0Concentration Units (ug/L or mg/kg dry weight): MG/KG

CAS No.	Analyte	Concentration	C	Q	M
7429-90-5	Aluminum				NR
7440-36-0	Antimony				NR
7440-38-2	Arsenic				NR
7440-39-3	Barium				NR
7440-41-7	Beryllium				NR
7440-43-9	Cadmium				NR
7440-70-2	Calcium				NR
7440-47-3	Chromium				NR
7440-48-4	Cobalt				NR
7440-50-8	Copper				NR
7439-89-6	Iron				NR
7439-92-1	Lead				NR
7439-95-4	Magnesium				NR
7439-96-5	Manganese				NR
7439-97-6	Mercury	0.13 ✓	U		CV
7440-02-0	Nickel				NR
7440-09-7	Potassium				NR
7782-49-2	Selenium				NR
7440-22-4	Silver				NR
7440-23-5	Sodium				NR
7440-28-0	Thallium				NR
7440-62-2	Vanadium				NR
7440-66-6	Zinc				NR
57-12-5	Cyanide				NR

Color Before: BROWN

Clarity Before: \_\_\_\_\_

Texture: MEDIUMColor After: YELLOW

Clarity After: \_\_\_\_\_

Artifacts: \_\_\_\_\_

Comments: \_\_\_\_\_


USEPA - CLP  
1A-IN  
INORGANIC ANALYSIS DATA SHEET

EPA SAMPLE NO.

**MJAA64**

Lab Name: CHEMTECH CONSULTING GROUP Contract: EPW06047

Lab Code: CHEM Case No.: 37825 NRAS No.: \_\_\_\_\_ SDG No.: MJAA56

Matrix: (soil/water) SOIL Lab Sample ID: Z5072-10

Level: (low/med) LOW Date Received: 09/24/2008

% Solids: 73.1 ✓

Concentration Units (ug/L or mg/kg dry weight): MG/KG

CAS No.	Analyte	Concentration	C	Q	M
7429-90-5	Aluminum				NR
7440-36-0	Antimony				NR
7440-38-2	Arsenic				NR
7440-39-3	Barium				NR
7440-41-7	Beryllium				NR
7440-43-9	Cadmium				NR
7440-70-2	Calcium				NR
7440-47-3	Chromium				NR
7440-48-4	Cobalt				NR
7440-50-8	Copper				NR
7439-89-6	Iron				NR
7439-92-1	Lead				NR
7439-95-4	Magnesium				NR
7439-96-5	Manganese				NR
7439-97-6	Mercury	0.14	✓ u/L		CV
7440-02-0	Nickel				NR
7440-09-7	Potassium				NR
7782-49-2	Selenium				NR
7440-22-4	Silver				NR
7440-23-5	Sodium				NR
7440-28-0	Thallium				NR
7440-62-2	Vanadium				NR
7440-66-6	Zinc				NR
57-12-5	Cyanide				NR

02/11/21/08

Color Before: BROWN Clarity Before: \_\_\_\_\_ Texture: MEDIUM

Color After: YELLOW Clarity After: \_\_\_\_\_ Artifacts: \_\_\_\_\_

Comments:

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## USEPA - CLP

1A-IN  
INORGANIC ANALYSIS DATA SHEET

EPA SAMPLE NO.

MJAA65

Lab Name: CHEMTECH CONSULTING GROUP Contract: EPW06047Lab Code: CHEM Case No.: 37825 NRAS No.: \_\_\_\_\_ SDG No.: MJAA56Matrix: (soil/water) SOIL Lab Sample ID: Z5072-11Level: (low/med) LOW Date Received: 09/24/2008% Solids: 80.2 ✓Concentration Units (ug/L or mg/kg dry weight): MG/KG

CAS No.	Analyte	Concentration	C	Q	M
7429-90-5	Aluminum				NR
7440-36-0	Antimony				NR
7440-38-2	Arsenic				NR
7440-39-3	Barium				NR
7440-41-7	Beryllium				NR
7440-43-9	Cadmium				NR
7440-70-2	Calcium				NR
7440-47-3	Chromium				NR
7440-48-4	Cobalt				NR
7440-50-8	Copper				NR
7439-89-6	Iron				NR
7439-92-1	Lead				NR
7439-95-4	Magnesium				NR
7439-96-5	Manganese				NR
7439-97-6	Mercury	0.12 ✓	U		CV
7440-02-0	Nickel				NR
7440-09-7	Potassium				NR
7782-49-2	Selenium				NR
7440-22-4	Silver				NR
7440-23-5	Sodium				NR
7440-28-0	Thallium				NR
7440-62-2	Vanadium				NR
7440-66-6	Zinc				NR
57-12-5	Cyanide				NR

Color Before: BROWN

Clarity Before: \_\_\_\_\_

Texture: MEDIUMColor After: YELLOW

Clarity After: \_\_\_\_\_

Artifacts: \_\_\_\_\_

Comments:

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## USEPA - CLP

1A-IN  
INORGANIC ANALYSIS DATA SHEET

EPA SAMPLE NO.

MJAA66

Lab Name: CHEMTECH CONSULTING GROUP Contract: EPW06047Lab Code: CHEM Case No.: 37825 NRAS No.: \_\_\_\_\_ SDG No.: MJAA56Matrix: (soil/water) SOILLab Sample ID: Z5072-12Level: (low/med) LOWDate Received: 09/24/2008% Solids: 59.2 ✓Concentration Units (ug/L or mg/kg dry weight): MG/KG

CAS No.	Analyte	Concentration	C	Q	M
7429-90-5	Aluminum				NR
7440-36-0	Antimony				NR
7440-38-2	Arsenic				NR
7440-39-3	Barium				NR
7440-41-7	Beryllium				NR
7440-43-9	Cadmium				NR
7440-70-2	Calcium				NR
7440-47-3	Chromium				NR
7440-48-4	Cobalt				NR
7440-50-8	Copper				NR
7439-89-6	Iron				NR
7439-92-1	Lead				NR
7439-95-4	Magnesium				NR
7439-96-5	Manganese				NR
7439-97-6	Mercury	0.18 ✓			CV
7440-02-0	Nickel				NR
7440-09-7	Potassium				NR
7782-49-2	Selenium				NR
7440-22-4	Silver				NR
7440-23-5	Sodium				NR
7440-28-0	Thallium				NR
7440-62-2	Vanadium				NR
7440-66-6	Zinc				NR
57-12-5	Cyanide				NR

Color Before: BROWN

Clarity Before: \_\_\_\_\_

Texture: MEDIUMColor After: YELLOW

Clarity After: \_\_\_\_\_

Artifacts: \_\_\_\_\_

Comments:

09/21/08

## USEPA - CLP

IA-IN  
INORGANIC ANALYSIS DATA SHEET

EPA SAMPLE NO.

MJAA67

Lab Name: CHEMTECH CONSULTING GROUP Contract: EPW06047Lab Code: CHEM Case No.: 37825 NRAS No.: \_\_\_\_\_ SDG No.: MJAA56Matrix: (soil/water) SOIL Lab Sample ID: Z5072-13Level: (low/med) LOW Date Received: 09/24/2008% Solids: 64.8 ✓Concentration Units (ug/L or mg/kg dry weight): MG/KG

CAS No.	Analyte	Concentration	C	Q	M
7429-90-5	Aluminum				NR
7440-36-0	Antimony				NR
7440-38-2	Arsenic				NR
7440-39-3	Barium				NR
7440-41-7	Beryllium				NR
7440-43-9	Cadmium				NR
7440-70-2	Calcium				NR
7440-47-3	Chromium				NR
7440-48-4	Cobalt				NR
7440-50-8	Copper				NR
7439-89-6	Iron				NR
7439-92-1	Lead				NR
7439-95-4	Magnesium				NR
7439-96-5	Manganese				NR
7439-97-6	Mercury	0.14 ✓	U		CV
7440-02-0	Nickel				NR
7440-09-7	Potassium				NR
7782-49-2	Selenium				NR
7440-22-4	Silver				NR
7440-23-5	Sodium				NR
7440-28-0	Thallium				NR
7440-62-2	Vanadium				NR
7440-66-6	Zinc				NR
57-12-5	Cyanide				NR

Color Before: BROWN Clarity Before: \_\_\_\_\_Texture: MEDIUMColor After: YELLOW Clarity After: \_\_\_\_\_

Artifacts: \_\_\_\_\_

Comments:


USEPA - CLP

1A-IN  
INORGANIC ANALYSIS DATA SHEET

EPA SAMPLE NO.

MJAA68

Lab Name: CHEMTECH CONSULTING GROUP Contract: EPW06047Lab Code: CHEM Case No.: 37825 NRAS No.: \_\_\_\_\_ SDG No.: MJAA56Matrix: (soil/water) SOIL Lab Sample ID: Z5072-14Level: (low/med) LOW Date Received: 09/24/2008% Solids: 74.3 ✓Concentration Units (ug/L or mg/kg dry weight): MG/KG

CAS No.	Analyte	Concentration	C	Q	M
7429-90-5	Aluminum				NR
7440-36-0	Antimony				NR
7440-38-2	Arsenic				NR
7440-39-3	Barium				NR
7440-41-7	Beryllium				NR
7440-43-9	Cadmium				NR
7440-70-2	Calcium				NR
7440-47-3	Chromium				NR
7440-48-4	Cobalt				NR
7440-50-8	Copper				NR
7439-89-6	Iron				NR
7439-92-1	Lead				NR
7439-95-4	Magnesium				NR
7439-96-5	Manganese				NR
7439-97-6	Mercury	0.12 ✓	U		CV
7440-02-0	Nickel				NR
7440-09-7	Potassium				NR
7782-49-2	Selenium				NR
7440-22-4	Silver				NR
7440-23-5	Sodium				NR
7440-28-0	Thallium				NR
7440-62-2	Vanadium				NR
7440-66-6	Zinc				NR
57-12-5	Cyanide				NR

Color Before: BROWN

Clarity Before: \_\_\_\_\_

Texture: MEDIUMColor After: YELLOW

Clarity After: \_\_\_\_\_

Artifacts: \_\_\_\_\_

Comments:

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## USEPA - CLP

1A-IN  
INORGANIC ANALYSIS DATA SHEET

EPA SAMPLE NO.

MJAA69

Lab Name: CHEMTECH CONSULTING GROUP Contract: EPW06047Lab Code: CHEM Case No.: 37825 NRAS No.: \_\_\_\_\_ SDG No.: MJAA56Matrix: (soil/water) SOIL Lab Sample ID: Z5072-15Level: (low/med) LOW Date Received: 09/24/2008% Solids: 75.1 ✓Concentration Units (ug/L or mg/kg dry weight): MG/KG

CAS No.	Analyte	Concentration	C	Q	M
7429-90-5	Aluminum				NR
7440-36-0	Antimony				NR
7440-38-2	Arsenic				NR
7440-39-3	Barium				NR
7440-41-7	Beryllium				NR
7440-43-9	Cadmium				NR
7440-70-2	Calcium				NR
7440-47-3	Chromium				NR
7440-48-4	Cobalt				NR
7440-50-8	Copper				NR
7439-89-6	Iron				NR
7439-92-1	Lead				NR
7439-95-4	Magnesium				NR
7439-96-5	Manganese				NR
7439-97-6	Mercury	0.13 ✓	U		CV
7440-02-0	Nickel				NR
7440-09-7	Potassium				NR
7782-49-2	Selenium				NR
7440-22-4	Silver				NR
7440-23-5	Sodium				NR
7440-28-0	Thallium				NR
7440-62-2	Vanadium				NR
7440-66-6	Zinc				NR
57-12-5	Cyanide				NR

Color Before: BROWN Clarity Before: \_\_\_\_\_Texture: MEDIUMColor After: YELLOW Clarity After: \_\_\_\_\_

Artifacts: \_\_\_\_\_

Comments:

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USEPA - CLP

1A-IN  
INORGANIC ANALYSIS DATA SHEET

EPA SAMPLE NO.

MJAA70

Lab Name: CHEMTECH CONSULTING GROUP Contract: EPW06047Lab Code: CHEM Case No.: 37825 NRAS No.: \_\_\_\_\_ SDG No.: MJAA56Matrix: (soil/water) SOIL Lab Sample ID: Z5072-16Level: (low/med) LOW Date Received: 09/24/2008% Solids: 63.7 ✓Concentration Units (ug/L or mg/kg dry weight): MG/KG

CAS No.	Analyte	Concentration	C	Q	M
7429-90-5	Aluminum				NR
7440-36-0	Antimony				NR
7440-38-2	Arsenic				NR
7440-39-3	Barium				NR
7440-41-7	Beryllium				NR
7440-43-9	Cadmium				NR
7440-70-2	Calcium				NR
7440-47-3	Chromium				NR
7440-48-4	Cobalt				NR
7440-50-8	Copper				NR
7439-89-6	Iron				NR
7439-92-1	Lead				NR
7439-95-4	Magnesium				NR
7439-96-5	Manganese				NR
7439-97-6	Mercury	0.16 ✓	U		CV
7440-02-0	Nickel				NR
7440-09-7	Potassium				NR
7782-49-2	Selenium				NR
7440-22-4	Silver				NR
7440-23-5	Sodium				NR
7440-28-0	Thallium				NR
7440-62-2	Vanadium				NR
7440-66-6	Zinc				NR
57-12-5	Cyanide				NR

Color Before: BROWN

Clarity Before: \_\_\_\_\_

Texture: MEDIUMColor After: YELLOW

Clarity After: \_\_\_\_\_

Artifacts: \_\_\_\_\_

Comments: \_\_\_\_\_



USEPA - CLP

1A-IN  
INORGANIC ANALYSIS DATA SHEET

EPA SAMPLE NO.

MJAA71

Lab Name: CHEMTECH CONSULTING GROUP Contract: EPW06047Lab Code: CHEM Case No.: 37825 NRAS No.: \_\_\_\_\_ SDG No.: MJAA56Matrix: (soil/water) SOIL Lab Sample ID: Z5072-17Level: (low/med) LOW Date Received: 09/24/2008% Solids: 73.3 ✓Concentration Units (ug/L or mg/kg dry weight): MG/KG

CAS No.	Analyte	Concentration	C	Q	M
7429-90-5	Aluminum				NR
7440-36-0	Antimony				NR
7440-38-2	Arsenic				NR
7440-39-3	Barium				NR
7440-41-7	Beryllium				NR
7440-43-9	Cadmium				NR
7440-70-2	Calcium				NR
7440-47-3	Chromium				NR
7440-48-4	Cobalt				NR
7440-50-8	Copper				NR
7439-89-6	Iron				NR
7439-92-1	Lead				NR
7439-95-4	Magnesium				NR
7439-96-5	Manganese				NR
7439-97-6	Mercury	0.14 ✓	U		CV
7440-02-0	Nickel				NR
7440-09-7	Potassium				NR
7782-49-2	Selenium				NR
7440-22-4	Silver				NR
7440-23-5	Sodium				NR
7440-28-0	Thallium				NR
7440-62-2	Vanadium				NR
7440-66-6	Zinc				NR
57-12-5	Cyanide				NR

Color Before: BROWN Clarity Before: \_\_\_\_\_ Texture: MEDIUMColor After: YELLOW Clarity After: \_\_\_\_\_ Artifacts: \_\_\_\_\_

Comments:

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## USEPA - CLP

1A-IN  
INORGANIC ANALYSIS DATA SHEET

EPA SAMPLE NO.

MJAA72

Lab Name: CHEMTECH CONSULTING GROUP Contract: EPW06047Lab Code: CHEM Case No.: 37825 NRAS No.: \_\_\_\_\_ SDG No.: MJAA56Matrix: (soil/water) SOIL Lab Sample ID: Z5072-18Level: (low/med) LOW Date Received: 09/24/2008% Solids: 80.8Concentration Units (ug/L or mg/kg dry weight): MG/KG

CAS No.	Analyte	Concentration	C	Q	M
7429-90-5	Aluminum				NR
7440-36-0	Antimony				NR
7440-38-2	Arsenic				NR
7440-39-3	Barium				NR
7440-41-7	Beryllium				NR
7440-43-9	Cadmium				NR
7440-70-2	Calcium				NR
7440-47-3	Chromium				NR
7440-48-4	Cobalt				NR
7440-50-8	Copper				NR
7439-89-6	Iron				NR
7439-92-1	Lead				NR
7439-95-4	Magnesium				NR
7439-96-5	Manganese				NR
7439-97-6	Mercury	0.12 ✓	U		CV
7440-02-0	Nickel				NR
7440-09-7	Potassium				NR
7782-49-2	Selenium				NR
7440-22-4	Silver				NR
7440-23-5	Sodium				NR
7440-28-0	Thallium				NR
7440-62-2	Vanadium				NR
7440-66-6	Zinc				NR
57-12-5	Cyanide				NR

Color Before: BROWN Clarity Before: \_\_\_\_\_ Texture: MEDIUMColor After: YELLOW Clarity After: \_\_\_\_\_ Artifacts: \_\_\_\_\_

Comments:


## USEPA - CLP

1A-IN  
INORGANIC ANALYSIS DATA SHEET

EPA SAMPLE NO.

MJAA83

Lab Name: CHEMTECH CONSULTING GROUP Contract: EPW06047Lab Code: CHEM Case No.: 37825 NRAS No.: \_\_\_\_\_ SDG No.: MJAA56Matrix: (soil/water) SOIL Lab Sample ID: Z5072-19Level: (low/med) LOW Date Received: 09/24/2008% Solids: 47.3 ✓Concentration Units (ug/L or mg/kg dry weight): MG/KG

CAS No.	Analyte	Concentration	C	Q	M
7429-90-5	Aluminum				NR
7440-36-0	Antimony				NR
7440-38-2	Arsenic				NR
7440-39-3	Barium				NR
7440-41-7	Beryllium				NR
7440-43-9	Cadmium				NR
7440-70-2	Calcium				NR
7440-47-3	Chromium				NR
7440-48-4	Cobalt				NR
7440-50-8	Copper				NR
7439-89-6	Iron				NR
7439-92-1	Lead				NR
7439-95-4	Magnesium				NR
7439-96-5	Manganese				NR
7439-97-6	Mercury	0.12 ✓	<del>130</del>		CV
7440-02-0	Nickel			22.11/24/08	NR
7440-09-7	Potassium				NR
7782-49-2	Selenium				NR
7440-22-4	Silver				NR
7440-23-5	Sodium				NR
7440-28-0	Thallium				NR
7440-62-2	Vanadium				NR
7440-66-6	Zinc				NR
57-12-5	Cyanide				NR

CORREL &gt; MDL

Color Before: BROWN

Clarity Before: \_\_\_\_\_

Texture: MEDIUMColor After: YELLOW

Clarity After: \_\_\_\_\_

Artifacts: \_\_\_\_\_

Comments:

## USEPA - CLP

IA-IN  
INORGANIC ANALYSIS DATA SHEET

EPA SAMPLE NO.

MJAAF6

Lab Name: CHEMTECH CONSULTING GROUP Contract: EPW06047Lab Code: CHEM Case No.: 37825 NRAS No.: \_\_\_\_\_ SDG No.: MJAA56Matrix: (soil/water) SOIL Lab Sample ID: Z5072-20Level: (low/med) LOW Date Received: 09/24/2008% Solids: 81.5 ✓Concentration Units (ug/L or mg/kg dry weight): MG/KG

CAS No.	Analyte	Concentration	C	Q	M
7429-90-5	Aluminum				NR
7440-36-0	Antimony				NR
7440-38-2	Arsenic				NR
7440-39-3	Barium				NR
7440-41-7	Beryllium				NR
7440-43-9	Cadmium				NR
7440-70-2	Calcium				NR
7440-47-3	Chromium				NR
7440-48-4	Cobalt				NR
7440-50-8	Copper				NR
7439-89-6	Iron				NR
7439-92-1	Lead				NR
7439-95-4	Magnesium				NR
7439-96-5	Manganese				NR
7439-97-6	Mercury	0.12	✓	UJL	CV
7440-02-0	Nickel			11/21/08	NR
7440-09-7	Potassium				NR
7782-49-2	Selenium				NR
7440-22-4	Silver				NR
7440-23-5	Sodium				NR
7440-28-0	Thallium				NR
7440-62-2	Vanadium				NR
7440-66-6	Zinc				NR
57-12-5	Cyanide				NR

Color Before: BROWN Clarity Before: \_\_\_\_\_ Texture: MEDIUMColor After: YELLOW Clarity After: \_\_\_\_\_ Artifacts: \_\_\_\_\_

Comments:

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# ecology and environment, inc.

International Specialists in the Environment

720 Third Avenue, Suite 1700, Seattle, WA 98104  
Tel: (206) 624-9537, Fax: (206) 621-9832

## MEMORANDUM

DATE: October 20, 2008

TO: Mark Woodke, Project Manager, E & E, Seattle, Washington

FROM: David Ikeda, Chemist, E & E, Seattle, Washington *DI*

SUBJ: **Inorganic Data Summary Check, Tuluksak River Site Inspection,  
Tuluksak, Alaska**

REF: TDD: 08-02-0007 PAN: 002233.0324.01SI

The data quality assurance summary check of 20 soil samples collected from the Tuluksak River in Tuluksak, Alaska has been completed. Inorganic analyses (EPA CLP SOW ILM05.4) were performed by Chemtech, Mountainside, New Jersey.

The samples were numbered:

MJAA55	MJAA60	MJAA65	MJAA70
MJAA56	MJAA61	MJAA66	MJAA71
MJAA57	MJAA62	MJAA67	MJAA72
MJAA58	MJAA63	MJAA68	MJAA83
MJAA59	MJAA64	MJAA69	MJAAF6

No discrepancies were noted. The secondary reviewer added "Q" bias qualifiers to positive sample results less than the contract required detection limit. For "Q" bias results, the secondary reviewer removed any qualifiers that the primary reviewer may have added.



UNITED STATES ENVIRONMENTAL PROTECTION AGENCY  
REGION 10  
1200 Sixth Avenue, Suite 900  
Seattle, Washington 98101

October 16, 2008

Reply To  
Attn. Of: OEA-095

MEMORANDUM

SUBJECT: Data Validation for Tuluksak River Site Inspection,  
Case# 37825, SDG: MJAA55, Inorganic Analysis

FROM: Donald Matheny, Chemist *DM*  
Environmental Services Unit, OEA

TO: Brandon Perkins, Site Assessment Manager  
Office of Environmental Cleanup (ECL-112)

CC: Renee Nordeen, Ecology & Environment

The data validation of inorganic analyses for the above sample set is complete. Twenty (20) soil/sediment samples were analyzed for total elements by Chemtech, Mountainside, NJ. Sample numbers for this delivery group are as follows:

MJAA55	MJAA56	MJAA57	MJAA58	MJAA59	MJAA60	MJAA61
MJAA62	MJAA63	MJAA64	MJAA65	MJAA66	MJAA67	MJAA68
MJAA69	MJAA70	MJAA71	MJAA72	MJAA83	MJAAF6	

**DATA QUALIFICATIONS**

The following comments refer to the lab's performance in meeting the specifications outlined in the "CLP Statement of Work (CLP-SOW) for Inorganic Analysis, rev. ILM05.4", the "USEPA Contract Laboratory Program National Functional Guidelines for Inorganic Data Review" and the judgment of the reviewer. The comments presented herein are based on the information provided for the review.

**TIMELINESS - Acceptable**

The holding time from the date of collection to the date of digestion and analyses were met for all elements (180 days). Samples were collected on 9/16/08 and 9/17/08. ICP-AES analysis was conducted on 10/10/08.

#### INSTRUMENT CALIBRATION/VERIFICATION - Acceptable

For ICP-AES analysis, instrument calibration was performed in accordance with method requirements. Recoveries for instrument verification standards (92-109%) met the frequency (10%) and recovery (90-110%).

Quantitation verification standards met both the frequency and recovery criteria for all elements.

#### ICP-AES INTERFERENCE CHECK SAMPLE (ICS) - Acceptable

An ICS was analyzed at the required frequency for each analytical run. ICS recoveries met the recovery criterion (80-120% or  $\pm 2 \times \text{CRQL}$ ) for all elements.

#### LABORATORY CONTROL SAMPLES (LCS) - Acceptable

An aqueous Laboratory Control Sample was digested and analyzed. Percent recoveries (98-106%) were within the control limits (80-120%).

#### BLANKS - Acceptable

Preparation and instrument control blanks were prepared and analyzed in accordance with method requirements. Blanks were not detected at concentrations that impact sample values.

#### MATRIX SPIKE ANALYSIS

A matrix spike was analyzed for sample MJAAF6. Percent recoveries (94-119%) met the criterion (75-125%) for all elements with the exception of silver (49%). Silver data were qualified (JL or UJL) and may be biased low.

#### DUPLICATE SAMPLE ANALYSIS - Acceptable

A duplicate sample was analyzed for sample MJAAF6. Relative percent differences ( $\leq 1\%$ ) met the control limits ( $\pm 35\%$  or  $\pm 2 \times \text{CRQL}$ ) for soils.

#### ICP-AES SERIAL DILUTION

A five-fold serial dilution was analyzed for sample MJAAF6. Percent differences ( $\leq 11\%$ ) were within the 1% allowable variance from the acceptance criteria ( $\leq 10\%$ ) for all applicable elements with the exception of zinc (15%). Zinc data were qualified (JL) and may be biased low.



## ASSESSMENT SUMMARY

The following is a summary of qualified data:

Silver data were qualified (JL or UJL) due to a low matrix spike recovery. Silver values may be biased low.

Zinc data were qualified (JL) due to a high percent difference in the serial dilution result. Values for zinc may be biased low.

## DATA QUALIFIERS

- U - The material was analyzed for, but was not detected above the level of the associated value. The associated value is either the sample quantitation limit or the sample detection limit.
- J - The associated value is an estimated quantity.
- R - The data are unusable. The analyte may or may not be present in the sample.
- UJ - The analyte was analyzed for, but was not detected. The associated value is an estimate and may be inaccurate or imprecise.

## PROJECT SPECIFIC DATA QUALIFIERS:

- L - Low bias.
- H - High bias.
- K - Unknown Bias.
- Q - Detected concentration is below the method reporting limit / Contract Required Quantitation Limit, but is above the method detection limit.

## USEPA - CLP

1A-IN  
INORGANIC ANALYSIS DATA SHEET

EPA SAMPLE NO.

MJAA55

Lab Name: CHEMTECH CONSULTING GROUP Contract: EPW06047Lab Code: CHEM Case No.: 37825 NRAS No.: \_\_\_\_\_ SDG No.: MJAA55Matrix: (soil/water) SOIL Lab Sample ID: Z4536-01Level: (low/med) LOW Date Received: 09/24/2008% Solids: 49.0Concentration Units (ug/L or mg/kg dry weight): MG/KG

CAS No.	Analyte	Concentration	C	Q	M
7429-90-5	Aluminum	13400			P
7440-36-0	Antimony	1.2	JQ		P
7440-38-2	Arsenic	28.1			P
7440-39-3	Barium	163			P
7440-41-7	Beryllium	0.34	JQ		P
7440-43-9	Cadmium	2.3			P
7440-70-2	Calcium	2890			P
7440-47-3	Chromium	22.4			P
7440-48-4	Cobalt	10.6			P
7440-50-8	Copper	22.1			P
7439-89-6	Iron	41300		<del>E</del>	P
7439-92-1	Lead	8.2			P
7439-95-4	Magnesium	4030			P
7439-96-5	Manganese	575			P
7439-97-6	Mercury				NR
7440-02-0	Nickel	21.4			P
7440-09-7	Potassium	585	JQ		P
7782-49-2	Selenium	7.1	U		P
7440-22-4	Silver	2.0	<del>U</del>	# UJL	P
7440-23-5	Sodium	177	JQ		P
7440-28-0	Thallium	5.1	U		P
7440-62-2	Vanadium	40.5			P
7440-66-6	Zinc	70.9		<del>E</del> JL	P
57-12-5	Cyanide				NR

Color Before: BROWN Clarity Before: \_\_\_\_\_ Texture: MEDIUMColor After: YELLOW Clarity After: \_\_\_\_\_ Artifacts: \_\_\_\_\_

Comments:

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①  
20 Oct 08

DM  
10-16-08

## USEPA - CLP

1A-IN  
INORGANIC ANALYSIS DATA SHEET

EPA SAMPLE NO.

MJAA56

Lab Name: CHEMTECH CONSULTING GROUP Contract: EPW06047Lab Code: CHEM Case No.: 37825 NRAS No.: \_\_\_\_\_ SDG No.: MJAA55Matrix: (soil/water) SOIL Lab Sample ID: Z4536-02Level: (low/med) LOW Date Received: 09/24/2008% Solids: 50.0Concentration Units (ug/L or mg/kg dry weight): MG/KG

CAS No.	Analyte	Concentration	C	Q	M
7429-90-5	Aluminum	15100			P
7440-36-0	Antimony	1.2	JQ		P
7440-38-2	Arsenic	27.0			P
7440-39-3	Barium	165			P
7440-41-7	Beryllium	0.37	JQ		P
7440-43-9	Cadmium	2.7			P
7440-70-2	Calcium	3780			P
7440-47-3	Chromium	26.5			P
7440-48-4	Cobalt	11.4			P
7440-50-8	Copper	21.2			P
7439-89-6	Iron	46300		<del>E</del>	P
7439-92-1	Lead	7.6			P
7439-95-4	Magnesium	5170			P
7439-96-5	Manganese	443			P
7439-97-6	Mercury				NR
7440-02-0	Nickel	26.5			P
7440-09-7	Potassium	660	JQ		P
7782-49-2	Selenium	7.0	U		P
7440-22-4	Silver	2.0	<del>U</del>	<del>N</del> UJL	P
7440-23-5	Sodium	216	JQ		P
7440-28-0	Thallium	5.0	U		P
7440-62-2	Vanadium	45.4			P
7440-66-6	Zinc	77.9		<del>E</del> JL	P
57-12-5	Cyanide				NR

Color Before: BROWN

Clarity Before: \_\_\_\_\_

Texture: MEDIUMColor After: YELLOW

Clarity After: \_\_\_\_\_

Artifacts: \_\_\_\_\_

Comments:

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## USEPA - CLP

1A-IN  
INORGANIC ANALYSIS DATA SHEET

EPA SAMPLE NO.

MJAA57

Lab Name: CHEMTECH CONSULTING GROUP Contract: EPW06047Lab Code: CHEM Case No.: 37825 NRAS No.: \_\_\_\_\_ SDG No.: MJAA55Matrix: (soil/water) SOILLab Sample ID: Z4536-03Level: (low/med) LOWDate Received: 09/24/2008% Solids: 78.5Concentration Units (ug/L or mg/kg dry weight): MG/KG

CAS No.	Analyte	Concentration	C	Q	M
7429-90-5	Aluminum	14000			P
7440-36-0	Antimony	1.4	JQ		P
7440-38-2	Arsenic	12.3			P
7440-39-3	Barium	94.7			P
7440-41-7	Beryllium	0.40	JQ		P
7440-43-9	Cadmium	1.9			P
7440-70-2	Calcium	2900			P
7440-47-3	Chromium	26.3			P
7440-48-4	Cobalt	15.1			P
7440-50-8	Copper	26.4			P
7439-89-6	Iron	32600		-E	P
7439-92-1	Lead	7.1			P
7439-95-4	Magnesium	6490			P
7439-96-5	Manganese	939			P
7439-97-6	Mercury				NR
7440-02-0	Nickel	32.2			P
7440-09-7	Potassium	578	JQ		P
7782-49-2	Selenium	4.5	U		P
7440-22-4	Silver	0.18	J	JQ + JL	P
7440-23-5	Sodium	165	JQ		P
7440-28-0	Thallium	3.2	U		P
7440-62-2	Vanadium	50.1			P
7440-66-6	Zinc	77.6		-E JL	P
57-12-5	Cyanide				NR

Color Before: BROWN

Clarity Before: \_\_\_\_\_

Texture: MEDIUMColor After: YELLOW

Clarity After: \_\_\_\_\_

Artifacts: \_\_\_\_\_

Comments:


## USEPA - CLP

IA-IN  
INORGANIC ANALYSIS DATA SHEET

EPA SAMPLE NO.

MJAA58

Lab Name: CHEMTECH CONSULTING GROUP Contract: EPW06047Lab Code: CHEM Case No.: 37825 NRAS No.: \_\_\_\_\_ SDG No.: MJAA55Matrix: (soil/water) SOIL Lab Sample ID: Z4536-04Level: (low/med) LOW Date Received: 09/24/2008% Solids: 52.1Concentration Units (ug/L or mg/kg dry weight): MG/KG

CAS No.	Analyte	Concentration	C	Q	M
7429-90-5	Aluminum	18400			P
7440-36-0	Antimony	1.2	JQ		P
7440-38-2	Arsenic	17.8			P
7440-39-3	Barium	161			P
7440-41-7	Beryllium	0.38	JQ		P
7440-43-9	Cadmium	2.2			P
7440-70-2	Calcium	3500			P
7440-47-3	Chromium	25.1			P
7440-48-4	Cobalt	12.3			P
7440-50-8	Copper	23.3			P
7439-89-6	Iron	39300		E	P
7439-92-1	Lead	8.4			P
7439-95-4	Magnesium	5850			P
7439-96-5	Manganese	519			P
7439-97-6	Mercury				NR
7440-02-0	Nickel	21.6			P
7440-09-7	Potassium	560	JQ		P
7782-49-2	Selenium	6.6	U		P
7440-22-4	Silver	1.9	E	N UJL	P
7440-23-5	Sodium	293	JQ		P
7440-28-0	Thallium	4.7	U		P
7440-62-2	Vanadium	57.3			P
7440-66-6	Zinc	72.7		E JL	P
57-12-5	Cyanide				NR

Color Before: BROWN Clarity Before: \_\_\_\_\_ Texture: MEDIUMColor After: YELLOW Clarity After: \_\_\_\_\_ Artifacts: \_\_\_\_\_

Comments:

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## USEPA - CLP

1A-IN  
INORGANIC ANALYSIS DATA SHEET

EPA SAMPLE NO.

MJAA59

Lab Name CHEMTECH CONSULTING GROUP Contract: EPW06047Lab Code: CHEM Case No.: 37825 NRAS No.: \_\_\_\_\_ SDG No.: MJAA55Matrix: (soil/water) SOIL Lab Sample ID: Z4536-05Level: (low/med) LOW Date Received: 09/24/2008% Solids: 67.7Concentration Units (ug/L or mg/kg dry weight): MG/KG

CAS No.	Analyte	Concentration	C	Q	M
7429-90-5	Aluminum	13700			P
7440-36-0	Antimony	1.3	JQ		P
7440-38-2	Arsenic	13.6			P
7440-39-3	Barium	134			P
7440-41-7	Beryllium	0.28	JQ		P
7440-43-9	Cadmium	1.8			P
7440-70-2	Calcium	2880			P
7440-47-3	Chromium	18.8			P
7440-48-4	Cobalt	9.4			P
7440-50-8	Copper	17.0			P
7439-89-6	Iron	34100		E	P
7439-92-1	Lead	5.9			P
7439-95-4	Magnesium	5060			P
7439-96-5	Manganese	401			P
7439-97-6	Mercury				NR
7440-02-0	Nickel	16.4			P
7440-09-7	Potassium	529	JQ		P
7782-49-2	Selenium	5.1	U		P
7440-22-4	Silver	1.4	E	N UJL	P
7440-23-5	Sodium	193	JQ		P
7440-28-0	Thallium	3.6	U		P
7440-62-2	Vanadium	45.3			P
7440-66-6	Zinc	54.1		E JL	P
57-12-5	Cyanide				NR

Color Before: BROWN

Clarity Before: \_\_\_\_\_

Texture: MEDIUMColor After: YELLOW

Clarity After: \_\_\_\_\_

Artifacts: \_\_\_\_\_

Comments:

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## USEPA - CLP

1A-IN  
INORGANIC ANALYSIS DATA SHEET

EPA SAMPLE NO.

MJAA60

Lab Name: CHEMTECH CONSULTING GROUP Contract: EPW06047Lab Code: CHEM Case No.: 37825 NRAS No.: \_\_\_\_\_ SDG No.: MJAA55Matrix: (soil/water) SOIL Lab Sample ID: Z4536-06Level: (low/med) LOW Date Received: 09/24/2008% Solids: 60.5Concentration Units (ug/L or mg/kg dry weight): MG/KG

CAS No.	Analyte	Concentration	C	Q	M
7429-90-5	Aluminum	16300			P
7440-36-0	Antimony	0.96	JQ		P
7440-38-2	Arsenic	8.7			P
7440-39-3	Barium	104			P
7440-41-7	Beryllium	0.31	JQ		P
7440-43-9	Cadmium	1.8			P
7440-70-2	Calcium	3040			P
7440-47-3	Chromium	26.1			P
7440-48-4	Cobalt	11.8			P
7440-50-8	Copper	18.5			P
7439-89-6	Iron	33400		E	P
7439-92-1	Lead	6.0			P
7439-95-4	Magnesium	7010			P
7439-96-5	Manganese	395			P
7439-97-6	Mercury				NR
7440-02-0	Nickel	26.2			P
7440-09-7	Potassium	596	JQ		P
7782-49-2	Selenium	5.7	U		P
7440-22-4	Silver	1.6	E	N UJL	P
7440-23-5	Sodium	181	JQ		P
7440-28-0	Thallium	4.1	U		P
7440-62-2	Vanadium	50.9			P
7440-66-6	Zinc	72.0		E JL	P
57-12-5	Cyanide				NR

Color Before: BROWN

Clarity Before: \_\_\_\_\_

Texture: MEDIUMColor After: YELLOW

Clarity After: \_\_\_\_\_

Artifacts: \_\_\_\_\_

Comments:

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## USEPA - CLP

1A-IN  
INORGANIC ANALYSIS DATA SHEET

EPA SAMPLE NO.

MJAA61

Lab Name: CHEMTECH CONSULTING GROUP Contract: EPW06047Lab Code: CHEM Case No.: 37825 NRAS No.: \_\_\_\_\_ SDG No.: MJAA55Matrix: (soil/water) SOIL Lab Sample ID: Z4536-07Level: (low/med) LOW Date Received: 09/24/2008% Solids: 75.0Concentration Units (ug/L or mg/kg dry weight): MG/KG

CAS No.	Analyte	Concentration	C	Q	M
7429-90-5	Aluminum	13300			P
7440-36-0	Antimony	0.84	JQ		P
7440-38-2	Arsenic	7.3			P
7440-39-3	Barium	76.4			P
7440-41-7	Beryllium	0.26	JQ		P
7440-43-9	Cadmium	1.5			P
7440-70-2	Calcium	2390			P
7440-47-3	Chromium	21.2			P
7440-48-4	Cobalt	10.9			P
7440-50-8	Copper	16.7			P
7439-89-6	Iron	27700		E	P
7439-92-1	Lead	4.4			P
7439-95-4	Magnesium	6450			P
7439-96-5	Manganese	537			P
7439-97-6	Mercury				NR
7440-02-0	Nickel	23.0			P
7440-09-7	Potassium	499	JQ		P
7782-49-2	Selenium	4.7	U		P
7440-22-4	Silver	1.3	E	* UJL	P
7440-23-5	Sodium	124	JQ		P
7440-28-0	Thallium	3.3	U		P
7440-62-2	Vanadium	44.7			P
7440-66-6	Zinc	61.6		E JL	P
57-12-5	Cyanide				NR

Color Before: BROWN

Clarity Before: \_\_\_\_\_

Texture: MEDIUMColor After: YELLOW

Clarity After: \_\_\_\_\_

Artifacts: \_\_\_\_\_

Comments:

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## USEPA--CLP

1A-IN  
INORGANIC ANALYSIS DATA SHEET

EPA SAMPLE NO.

MJAA62

Lab Name: CHEMTECH CONSULTING GROUP Contract: EPW06047Lab Code: CHEM Case No.: 37825 NRAS No.: \_\_\_\_\_ SDG No.: MJAA55Matrix: (soil/water) SOIL Lab Sample ID: Z4536-08Level: (low/med) LOW Date Received: 09/24/2008% Solids: 71.9Concentration Units (ug/L or mg/kg dry weight): MG/KG

CAS No.	Analyte	Concentration	C	Q	M
7429-90-5	Aluminum	13900			P
7440-36-0	Antimony	1.1	JQ		P
7440-38-2	Arsenic	8.7			P
7440-39-3	Barium	85.8			P
7440-41-7	Beryllium	0.25	JQ		P
7440-43-9	Cadmium	1.5			P
7440-70-2	Calcium	2420			P
7440-47-3	Chromium	20.3			P
7440-48-4	Cobalt	10.9			P
7440-50-8	Copper	18.3			P
7439-89-6	Iron	27100		<del>E</del>	P
7439-92-1	Lead	4.6			P
7439-95-4	Magnesium	6600			P
7439-96-5	Manganese	715			P
7439-97-6	Mercury				NR
7440-02-0	Nickel	20.6			P
7440-09-7	Potassium	603	JQ		P
7782-49-2	Selenium	4.9	U		P
7440-22-4	Silver	1.4	<del>E</del>	* UJL	P
7440-23-5	Sodium	115	JQ		P
7440-28-0	Thallium	3.5	U		P
7440-62-2	Vanadium	50.2			P
7440-66-6	Zinc	58.2		<del>E</del> JL	P
57-12-5	Cyanide				NR

Color Before: BROWN Clarity Before: \_\_\_\_\_ Texture: MEDIUMColor After: YELLOW Clarity After: \_\_\_\_\_ Artifacts: \_\_\_\_\_

Comments:

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INORGANIC ANALYSIS DATA SHEET

EPA SAMPLE NO.

MJAA63

Lab Name: CHEMTECH CONSULTING GROUP Contract: EPW06047

Lab Code: CHEM Case No.: 37825 NRAS No.: \_\_\_\_\_ SDG No.: MJAA55

Matrix: (soil/water) SOIL Lab Sample ID: Z4536-09

Level: (low/med) LOW Date Received: 09/24/2008

% Solids: 75.0

Concentration Units (ug/L or mg/kg dry weight): MG/KG

CAS No.	Analyte	Concentration	C	Q	M
7429-90-5	Aluminum	11400			P
7440-36-0	Antimony	0.72	JQ		P
7440-38-2	Arsenic	7.3			P
7440-39-3	Barium	62.7			P
7440-41-7	Beryllium	0.21	JQ		P
7440-43-9	Cadmium	1.2			P
7440-70-2	Calcium	2230			P
7440-47-3	Chromium	15.8			P
7440-48-4	Cobalt	9.3			P
7440-50-8	Copper	17.4			P
7439-89-6	Iron	23500		<del>E</del>	P
7439-92-1	Lead	3.8			P
7439-95-4	Magnesium	6100			P
7439-96-5	Manganese	536			P
7439-97-6	Mercury				NR
7440-02-0	Nickel	16.1			P
7440-09-7	Potassium	507	JQ		P
7782-49-2	Selenium	4.7	U		P
7440-22-4	Silver	1.3	<del>U</del>	<del>H</del> <del>U</del> <del>JL</del>	P
7440-23-5	Sodium	178	JQ		P
7440-28-0	Thallium	3.3	U		P
7440-62-2	Vanadium	44.7			P
7440-66-6	Zinc	50.0		<del>E</del> <del>JL</del>	P
57-12-5	Cyanide				NR

Color Before: BROWN Clarity Before: \_\_\_\_\_ Texture: MEDIUM

Color After: YELLOW Clarity After: \_\_\_\_\_ Artifacts: \_\_\_\_\_

Comments:

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## USEPA - CLP

1A-IN  
INORGANIC ANALYSIS DATA SHEET

EPA SAMPLE NO.

MJAA64

Lab Name: CHEMTECH CONSULTING GROUP Contract: EPW06047Lab Code: CHEM Case No.: 37825 NRAS No.: \_\_\_\_\_ SDG No.: MJAA55Matrix: (soil/water) SOIL Lab Sample ID: Z4536-10Level: (low/med) LOW Date Received: 09/24/2008% Solids: 73.1Concentration Units (ug/L or mg/kg dry weight): MG/KG

CAS No.	Analyte	Concentration	C	Q	M
7429-90-5	Aluminum	13200			P
7440-36-0	Antimony	1.0	JQ		P
7440-38-2	Arsenic	10.5			P
7440-39-3	Barium	98.5			P
7440-41-7	Beryllium	0.27	JQ		P
7440-43-9	Cadmium	1.4			P
7440-70-2	Calcium	2720			P
7440-47-3	Chromium	16.4			P
7440-48-4	Cobalt	10.8			P
7440-50-8	Copper	17.7			P
7439-89-6	Iron	25100			P
7439-92-1	Lead	4.2			P
7439-95-4	Magnesium	6370			P
7439-96-5	Manganese	505			P
7439-97-6	Mercury				NR
7440-02-0	Nickel	15.7			P
7440-09-7	Potassium	757			P
7782-49-2	Selenium	4.8	U		P
7440-22-4	Silver	1.4	H	H UJL	P
7440-23-5	Sodium	128	JQ		P
7440-28-0	Thallium	3.4	U		P
7440-62-2	Vanadium	51.1			P
7440-66-6	Zinc	51.9		H JL	P
57-12-5	Cyanide				NR

Color Before: BROWN Clarity Before: \_\_\_\_\_ Texture: MEDIUMColor After: YELLOW Clarity After: \_\_\_\_\_ Artifacts: \_\_\_\_\_

Comments:

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USEPA - CLP  
1A-IN  
INORGANIC ANALYSIS DATA SHEET

EPA SAMPLE NO.

MJAA65

Lab Name CHEMTECH CONSULTING GROUP Contract: EPW06047

Lab Code: CHEM Case No.: 37825 NRAS No.: \_\_\_\_\_ SDG No.: MJAA55

Matrix: (soil/water) SOIL Lab Sample ID: Z4536-11

Level: (low/med) LOW Date Received: 09/24/2008

% Solids: 80.2

Concentration Units (ug/L or mg/kg dry weight): MG/KG

CAS No.	Analyte	Concentration	C	Q	M
7429-90-5	Aluminum	11200			P
7440-36-0	Antimony	0.64	JQ		P
7440-38-2	Arsenic	8.4			P
7440-39-3	Barium	76.1			P
7440-41-7	Beryllium	0.19	JQ		P
7440-43-9	Cadmium	1.1			P
7440-70-2	Calcium	2510			P
7440-47-3	Chromium	14.2			P
7440-48-4	Cobalt	8.6			P
7440-50-8	Copper	16.1			P
7439-89-6	Iron	21200		E	P
7439-92-1	Lead	3.8			P
7439-95-4	Magnesium	5360			P
7439-96-5	Manganese	501			P
7439-97-6	Mercury				NR
7440-02-0	Nickel	12.9			P
7440-09-7	Potassium	616	JQ		P
7782-49-2	Selenium	4.3	U		P
7440-22-4	Silver	1.2	U	* UJL	P
7440-23-5	Sodium	194	JQ		P
7440-28-0	Thallium	3.1	U		P
7440-62-2	Vanadium	43.9			P
7440-66-6	Zinc	43.0		E JL	P
57-12-5	Cyanide				NR

Color Before: BROWN Clarity Before: \_\_\_\_\_ Texture: MEDIUM

Color After: YELLOW Clarity After: \_\_\_\_\_ Artifacts: \_\_\_\_\_

Comments:

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USEPA - CLP  
1A-IN  
INORGANIC ANALYSIS DATA SHEET

EPA SAMPLE NO.

MJAA66

Lab Name: CHEMTECH CONSULTING GROUP Contract: EPW06047

Lab Code: CHEM Case No.: 37825 NRAS No.: \_\_\_\_\_ SDG No.: MJAA55

Matrix: (soil/water) SOIL Lab Sample ID: Z4536-12

Level: (low/med) LOW Date Received: 09/24/2008

% Solids: 59.2

Concentration Units (ug/L or mg/kg dry weight): MG/KG

CAS No.	Analyte	Concentration	C	Q	M
7429-90-5	Aluminum	15500			P
7440-36-0	Antimony	1.0	JQ		P
7440-38-2	Arsenic	14.2			P
7440-39-3	Barium	121			P
7440-41-7	Beryllium	0.28	JQ		P
7440-43-9	Cadmium	1.6			P
7440-70-2	Calcium	3720			P
7440-47-3	Chromium	18.7			P
7440-48-4	Cobalt	13.5			P
7440-50-8	Copper	24.1			P
7439-89-6	Iron	30400		<del>E</del>	P
7439-92-1	Lead	5.6			P
7439-95-4	Magnesium	7680			P
7439-96-5	Manganese	768			P
7439-97-6	Mercury				NR
7440-02-0	Nickel	17.4			P
7440-09-7	Potassium	978			P
7782-49-2	Selenium	5.8	U		P
7440-22-4	Silver	1.7	<del>E</del>	* UJL	P
7440-23-5	Sodium	161	JQ		P
7440-28-0	Thallium	4.1	U		P
7440-62-2	Vanadium	61.6			P
7440-66-6	Zinc	64.3		<del>E</del> JL	P
57-12-5	Cyanide				NR

Color Before: BROWN Clarity Before: \_\_\_\_\_ Texture: MEDIUM

Color After: YELLOW Clarity After: \_\_\_\_\_ Artifacts: \_\_\_\_\_

Comments:

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## USEPA - CLP

1A-IN  
INORGANIC ANALYSIS DATA SHEET

EPA SAMPLE NO.

MJAA67

Lab Name: CHEMTECH CONSULTING GROUP Contract: EPW06047Lab Code: CHEM Case No.: 37825 NRAS No.: \_\_\_\_\_ SDG No.: MJAA55Matrix: (soil/water) SOIL Lab Sample ID: Z4536-13Level: (low/med) LOW Date Received: 09/24/2008% Solids: 64.8Concentration Units (ug/L or mg/kg dry weight): MG/KG

CAS No.	Analyte	Concentration	C	Q	M
7429-90-5	Aluminum	17700			P
7440-36-0	Antimony	1.1	JQ		P
7440-38-2	Arsenic	12.7			P
7440-39-3	Barium	135			P
7440-41-7	Beryllium	0.34	JQ		P
7440-43-9	Cadmium	1.6			P
7440-70-2	Calcium	4190			P
7440-47-3	Chromium	19.8			P
7440-48-4	Cobalt	13.5			P
7440-50-8	Copper	24.9			P
7439-89-6	Iron	29300		E	P
7439-92-1	Lead	7.0			P
7439-95-4	Magnesium	6550			P
7439-96-5	Manganese	637			P
7439-97-6	Mercury				NR
7440-02-0	Nickel	16.3			P
7440-09-7	Potassium	1130			P
7782-49-2	Selenium	5.4	U		P
7440-22-4	Silver	1.5	E	# UJL	P
7440-23-5	Sodium	242	JQ		P
7440-28-0	Thallium	3.9	U		P
7440-62-2	Vanadium	64.4			P
7440-66-6	Zinc	59.0		E JL	P
57-12-5	Cyanide				NR

Color Before: BROWN

Clarity Before: \_\_\_\_\_

Texture: MEDIUMColor After: YELLOW

Clarity After: \_\_\_\_\_

Artifacts: \_\_\_\_\_

Comments:

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20 OCT 08

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16-16-08



## USEPA - CLP

1A-IN  
INORGANIC ANALYSIS DATA SHEET

EPA SAMPLE NO.

MJAA68

Lab Name: CHEMTECH CONSULTING GROUP Contract: EPW06047Lab Code: CHEM Case No.: 37825 NRAS No.: \_\_\_\_\_ SDG No.: MJAA55Matrix: (soil/water) SOILLab Sample ID: Z4536-14Level: (low/med) LOWDate Received: 09/24/2008% Solids: 74.3Concentration Units (ug/L or mg/kg dry weight): MG/KG

CAS No.	Analyte	Concentration	C	Q	M
7429-90-5	Aluminum	13000			P
7440-36-0	Antimony	1.3	JQ		P
7440-38-2	Arsenic	15.1			P
7440-39-3	Barium	87.1			P
7440-41-7	Beryllium	0.25	JQ		P
7440-43-9	Cadmium	1.4			P
7440-70-2	Calcium	3000			P
7440-47-3	Chromium	17.6			P
7440-48-4	Cobalt	11.2			P
7440-50-8	Copper	24.1			P
7439-89-6	Iron	26800			P
7439-92-1	Lead	5.2			P
7439-95-4	Magnesium	6770			P
7439-96-5	Manganese	591			P
7439-97-6	Mercury				NR
7440-02-0	Nickel	15.7			P
7440-09-7	Potassium	800			P
7782-49-2	Selenium	4.7	U		P
7440-22-4	Silver	1.3	H	N USL	P
7440-23-5	Sodium	143	JQ		P
7440-28-0	Thallium	3.4	U		P
7440-62-2	Vanadium	54.1			P
7440-66-6	Zinc	55.9		H JL	P
57-12-5	Cyanide				NR

20 OCT 08

DM

10-16-08

Color Before: BROWN

Clarity Before: \_\_\_\_\_

Texture: MEDIUMColor After: YELLOW

Clarity After: \_\_\_\_\_

Artifacts: \_\_\_\_\_

Comments:

USEPA - CLP  
1A-IN  
INORGANIC ANALYSIS DATA SHEET

EPA SAMPLE NO.

MJAA69

Lab Name: CHEMTECH CONSULTING GROUP Contract: EPW06047

Lab Code: CHEM Case No.: 37825 NRAS No.: \_\_\_\_\_ SDG No.: MJAA55

Matrix: (soil/water) SOIL Lab Sample ID: Z4536-15

Level: (low/med) LOW Date Received: 09/24/2008

% Solids: 75.1

Concentration Units (ug/L or mg/kg dry weight): MG/KG

CAS No.	Analyte	Concentration	C	Q	M
7429-90-5	Aluminum	13500			P
7440-36-0	Antimony	1.0	JQ		P
7440-38-2	Arsenic	11.8			P
7440-39-3	Barium	103			P
7440-41-7	Beryllium	0.21	JQ		P
7440-43-9	Cadmium	1.4			P
7440-70-2	Calcium	2620			P
7440-47-3	Chromium	17.3			P
7440-48-4	Cobalt	10.4			P
7440-50-8	Copper	23.4			P
7439-89-6	Iron	27200		E	P
7439-92-1	Lead	4.7			P
7439-95-4	Magnesium	7930			P
7439-96-5	Manganese	665			P
7439-97-6	Mercury				NR
7440-02-0	Nickel	15.6			P
7440-09-7	Potassium	875			P
7782-49-2	Selenium	4.7	U		P
7440-22-4	Silver	0.16	J	JQ + JL	P
7440-23-5	Sodium	126	JQ		P
7440-28-0	Thallium	3.3	U		P
7440-62-2	Vanadium	57.9			P
7440-66-6	Zinc	59.8		E JL	P
57-12-5	Cyanide				NR

Color Before: BROWN

Clarity Before: \_\_\_\_\_

Texture: MEDIUM

Color After: YELLOW

Clarity After: \_\_\_\_\_

Artifacts: \_\_\_\_\_

Comments:

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2008-08

DM  
10-16-08

## USEPA - CLP

1A-IN  
INORGANIC ANALYSIS DATA SHEET

EPA SAMPLE NO.

MJAA70

Lab Name CHEMTECH CONSULTING GROUP Contract: EPW06047Lab Code: CHEM Case No.: 37825 NRAS No.: \_\_\_\_\_ SDG No.: MJAA55Matrix: (soil/water) SOIL Lab Sample ID: Z4536-16Level: (low/med) LOW Date Received: 09/24/2008% Solids: 63.7Concentration Units (ug/L or mg/kg dry weight): MG/KG

CAS No.	Analyte	Concentration	C	Q	M
7429-90-5	Aluminum	19800			P
7440-36-0	Antimony	1.2	JQ		P
7440-38-2	Arsenic	23.1			P
7440-39-3	Barium	152			P
7440-41-7	Beryllium	0.34	JQ		P
7440-43-9	Cadmium	1.9			P
7440-70-2	Calcium	4340			P
7440-47-3	Chromium	25.9			P
7440-48-4	Cobalt	17.0			P
7440-50-8	Copper	27.0			P
7439-89-6	Iron	35600		E	P
7439-92-1	Lead	6.0			P
7439-95-4	Magnesium	9710			P
7439-96-5	Manganese	670			P
7439-97-6	Mercury				NR
7440-02-0	Nickel	23.6			P
7440-09-7	Potassium	1000			P
7782-49-2	Selenium	5.5	U		P
7440-22-4	Silver	1.6	U	N UJL	P
7440-23-5	Sodium	159	JQ		P
7440-28-0	Thallium	3.9	U		P
7440-62-2	Vanadium	75.6			P
7440-66-6	Zinc	75.6		E JL	P
57-12-5	Cyanide				NR

Color Before: BROWN Clarity Before: \_\_\_\_\_ Texture: MEDIUMColor After: YELLOW Clarity After: \_\_\_\_\_ Artifacts: \_\_\_\_\_

Comments:

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20 Oct 08

DM  
10-16-08

## USEPA - CLP

1A-IN  
INORGANIC ANALYSIS DATA SHEET

EPA SAMPLE NO.

MJAA71

Lab Name: CHEMTECH CONSULTING GROUP Contract: EPW06047Lab Code: CHEM Case No.: 37825 NRAS No.: \_\_\_\_\_ SDG No.: MJAA55Matrix: (soil/water) SOILLab Sample ID: Z4536-17Level: (low/med) LOWDate Received: 09/24/2008% Solids: 73.3Concentration Units (ug/L or mg/kg dry weight): MG/KG

CAS No.	Analyte	Concentration	C	Q	M
7429-90-5	Aluminum	7190			P
7440-36-0	Antimony	0.63	JQ		P
7440-38-2	Arsenic	6.7			P
7440-39-3	Barium	91.3			P
7440-41-7	Beryllium	0.21	JQ		P
7440-43-9	Cadmium	0.79			P
7440-70-2	Calcium	2140			P
7440-47-3	Chromium	11.6			P
7440-48-4	Cobalt	7.9			P
7440-50-8	Copper	8.0			P
7439-89-6	Iron	15400		E	P
7439-92-1	Lead	3.4			P
7439-95-4	Magnesium	3960			P
7439-96-5	Manganese	402			P
7439-97-6	Mercury				NR
7440-02-0	Nickel	8.2			P
7440-09-7	Potassium	996			P
7782-49-2	Selenium	4.7	U		P
7440-22-4	Silver	1.4	E	N UJL	P
7440-23-5	Sodium	136	JQ		P
7440-28-0	Thallium	3.4	U		P
7440-62-2	Vanadium	36.2			P
7440-66-6	Zinc	35.0		E JL	P
57-12-5	Cyanide				NR

Color Before: BROWN

Clarity Before: \_\_\_\_\_

Texture: MEDIUMColor After: YELLOW

Clarity After: \_\_\_\_\_

Artifacts: \_\_\_\_\_

Comments:

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20 OCT 08

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10-16-08

## USEPA - CLP

1A-IN  
INORGANIC ANALYSIS DATA SHEET

EPA SAMPLE NO.

MJAA72

Lab Name: CHEMTECH CONSULTING GROUP Contract: EPW06047Lab Code: CHEM Case No.: 37825 NRAS No.: \_\_\_\_\_ SDG No.: MJAA55Matrix: (soil/water) SOIL Lab Sample ID: Z4536-18Level: (low/med) LOW Date Received: 09/24/2008% Solids: 80.8Concentration Units (ug/L or mg/kg dry weight): MG/KG

CAS No.	Analyte	Concentration	C	Q	M
7429-90-5	Aluminum	5050			P
7440-36-0	Antimony	7.4	U		P
7440-38-2	Arsenic	4.5			P
7440-39-3	Barium	72.4			P
7440-41-7	Beryllium	0.17	JQ		P
7440-43-9	Cadmium	0.69			P
7440-70-2	Calcium	1630			P
7440-47-3	Chromium	9.8			P
7440-48-4	Cobalt	5.8	JQ		P
7440-50-8	Copper	5.0			P
7439-89-6	Iron	13500		<del>P</del>	P
7439-92-1	Lead	3.1			P
7439-95-4	Magnesium	2770			P
7439-96-5	Manganese	322			P
7439-97-6	Mercury				NR
7440-02-0	Nickel	6.4			P
7440-09-7	Potassium	749			P
7782-49-2	Selenium	4.3	U		P
7440-22-4	Silver	1.2	<del>U</del>	<del>U</del> JL	P
7440-23-5	Sodium	79.4	JQ		P
7440-28-0	Thallium	3.1	U		P
7440-62-2	Vanadium	29.7			P
7440-66-6	Zinc	25.8		<del>P</del> JL	P
57-12-5	Cyanide				NR

Color Before: BROWN

Clarity Before: \_\_\_\_\_

Texture: MEDIUMColor After: YELLOW

Clarity After: \_\_\_\_\_

Artifacts: \_\_\_\_\_

Comments:

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2008-08

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10-16-08

## USEPA - CLP

IA-IN  
INORGANIC ANALYSIS DATA SHEET

EPA SAMPLE NO.

MJAA83

Lab Name: CHEMTECH CONSULTING GROUP Contract: EPW06047Lab Code: CHEM Case No.: 37825 NRAS No.: \_\_\_\_\_ SDG No.: MJAA55Matrix: (soil/water) SOIL Lab Sample ID: Z4536-19Level: (low/med) LOW Date Received: 09/24/2008% Solids: 47.3Concentration Units (ug/L or mg/kg dry weight): MG/KG

CAS No.	Analyte	Concentration	C	Q	M
7429-90-5	Aluminum	15300			P
7440-36-0	Antimony	1.2	JQ		P
7440-38-2	Arsenic	17.6			P
7440-39-3	Barium	150			P
7440-41-7	Beryllium	0.39	JQ		P
7440-43-9	Cadmium	2.0			P
7440-70-2	Calcium	3840			P
7440-47-3	Chromium	25.3			P
7440-48-4	Cobalt	10.6			P
7440-50-8	Copper	24.8			P
7439-89-6	Iron	37900		E	P
7439-92-1	Lead	8.7			P
7439-95-4	Magnesium	4580			P
7439-96-5	Manganese	583			P
7439-97-6	Mercury				NR
7440-02-0	Nickel	25.7			P
7440-09-7	Potassium	566	JQ		P
7782-49-2	Selenium	7.4	U		P
7440-22-4	Silver	2.1	H	N UJL	P
7440-23-5	Sodium	221	JQ		P
7440-28-0	Thallium	5.3	U		P
7440-62-2	Vanadium	42.5			P
7440-66-6	Zinc	72.7		E JL	P
57-12-5	Cyanide				NR

Color Before: BROWN

Clarity Before: \_\_\_\_\_

Texture: MEDIUMColor After: YELLOW

Clarity After: \_\_\_\_\_

Artifacts: \_\_\_\_\_

Comments:

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## USEPA - CLP

1A-IN  
INORGANIC ANALYSIS DATA SHEET

EPA SAMPLE NO.

MJAAF6

Lab Name: CHEMTECH CONSULTING GROUP Contract: EPW06047Lab Code: CHEM Case No.: 37825 NRAS No.: \_\_\_\_\_ SDG No.: MJAA55Matrix: (soil/water) SOILLab Sample ID: Z4536-20Level: (low/med) LOWDate Received: 09/24/2008% Solids: 81.5Concentration Units (ug/L or mg/kg dry weight): MG/KG

CAS No.	Analyte	Concentration	C	Q	M
7429-90-5	Aluminum	3820			P
7440-36-0	Antimony	7.4	U		P
7440-38-2	Arsenic	1.4			P
7440-39-3	Barium	66.2			P
7440-41-7	Beryllium	0.15	JQ		P
7440-43-9	Cadmium	0.57	JQ		P
7440-70-2	Calcium	1080			P
7440-47-3	Chromium	3.4			P
7440-48-4	Cobalt	4.2	JQ		P
7440-50-8	Copper	2.3	JQ		P
7439-89-6	Iron	12000		<del>P</del>	P
7439-92-1	Lead	2.3			P
7439-95-4	Magnesium	2030			P
7439-96-5	Manganese	255			P
7439-97-6	Mercury				NR
7440-02-0	Nickel	2.5	JQ		P
7440-09-7	Potassium	634			P
7782-49-2	Selenium	4.3	U		P
7440-22-4	Silver	1.2	<del>U</del>	* UJL	P
7440-23-5	Sodium	69.7	JQ		P
7440-28-0	Thallium	3.1	U		P
7440-62-2	Vanadium	21.1			P
7440-66-6	Zinc	19.8		<del>E</del> JL	P
57-12-5	Cyanide				NR

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20 OCT 08

Color Before: BROWN

Clarity Before: \_\_\_\_\_

Texture: MEDIUMColor After: YELLOW

Clarity After: \_\_\_\_\_

Artifacts: \_\_\_\_\_

Comments:

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## USEPA - CLP

9-IN  
METHOD DETECTION LIMITS (ANNUALLY)Lab Name: CHEMTECH CONSULTING GROUP Contract: EPW06047Lab Code: CHEM Case No.: 37825 NRAS No.: \_\_\_\_\_ SDG No.: MJAA55Instrument Type: P Instrument ID: P4 Date: 01/15/2008Preparation Method: HS1Concentration Units (ug/L or mg/kg): MG/KG

Analyte	Wavelength /Mass	CRQL	MDL
Aluminum	308.20	20	0.69
Antimony	206.80	6	0.41
Arsenic	193.70	1	0.37
Barium	493.40	20	0.090
Beryllium	234.80	0.5	0.010
Cadmium	226.50	0.5	0.040
Calcium	373.60	500	3.3
Chromium	267.70	1	0.080
Cobalt	228.60	5	0.080
Copper	224.70	2.5	0.10
Iron	259.80	10	0.20
Lead	220.30	1	0.25
Magnesium	279.00	500	5.3
Manganese	257.60	1.5	0.17
Mercury		0.1	
Nickel	231.60	4	0.14
Potassium	766.40	500	4.7
Selenium	196.00	3.5	0.35
Silver	328.00	1	0.090
Sodium	589.50	500	2.4
Thallium	190.80	2.5	0.56
Vanadium	292.40	5	0.12
Zinc	206.20	6	0.070
Cyanide		2.5	

Comments:



## USEPA - CLP

9-IN  
METHOD DETECTION LIMITS (ANNUALLY)Lab Name: CHEMTECH CONSULTING GROUP Contract: EPW06047Lab Code: CHEM Case No.: 37825 NRAS No.: \_\_\_\_\_ SDG No.: MJAA55Instrument Type: P Instrument ID: P4 Date: 01/15/2008Preparation Method: NPIConcentration Units (ug/L or mg/kg): UG/L

Analyte	Wavelength /Mass	CRQL	MDL
Aluminum	308.20	200	12.4
Antimony	206.80	60	2.3
Arsenic	193.70	10	4.1
Barium	493.40	200	2.6
Beryllium	234.80	5	0.20
Cadmium	226.50	5	0.40
Calcium	373.60	5000	106
Chromium	267.70	10	0.80
Cobalt	228.60	50	1.0
Copper	224.70	25	1.6
Iron	259.80	100	3.6
Lead	220.30	10	4.2
Magnesium	279.00	5000	31.2
Manganese	257.60	15	1.9
Mercury		0.2	
Nickel	231.60	40	2.9
Potassium	766.40	5000	35.9
Selenium	196.00	35	3.9
Silver	328.00	10	0.90
Sodium	589.50	5000	25.1
Thallium	190.80	25	2.2
Vanadium	292.40	50	0.60
Zinc	206.20	60	0.70
Cyanide		10	

Comments:

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USEPA - CLP  
12-IN  
PREPARATION LOG

Lab Name CHEMTECH CONSULTING GROUP Contract: EPW06047

Lab Code: CHEM Case No.: 37825 NRAS No.: \_\_\_\_\_ SDG No.: MJAA55

Preparation Method: HS1

EPA Sample No.	Preparation Date	Weight (gram)	Volume (mL)
LCSS	09/29/2008	1.00	100
MJAA55	09/29/2008	1.00	100
MJAA56	09/29/2008	1.00	100
MJAA57	09/29/2008	1.00	100
MJAA58	09/29/2008	1.02	100
MJAA59	09/29/2008	1.02	100
MJAA60	09/29/2008	1.01	100
MJAA61	09/29/2008	1.00	100
MJAA62	09/29/2008	1.00	100
MJAA63	09/29/2008	1.00	100
MJAA64	09/29/2008	1.00	100
MJAA65	09/29/2008	1.01	100
MJAA66	09/29/2008	1.02	100
MJAA67	09/29/2008	1.00	100
MJAA68	09/29/2008	1.00	100
MJAA69	09/29/2008	1.00	100
MJAA70	09/29/2008	1.00	100
MJAA71	09/29/2008	1.01	100
MJAA72	09/29/2008	1.01	100
MJAA83	09/29/2008	1.00	100
MJAAF6	09/29/2008	1.00	100
MJAAF6D	09/29/2008	1.00	100
MJAAF6S	09/29/2008	1.00	100
PBS	09/29/2008	1.00	100



# ecology and environment, inc.

International Specialists in the Environment

720 Third Avenue, Suite 1700, Seattle, WA 98104  
Tel: (206) 624-9537, Fax: (206) 621-9832

## MEMORANDUM

DATE: December 12, 2008

TO: Mark Woodke, START-3 Project Manager, E & E, Seattle, Washington

FROM: Bryan Vasser, START-3 Chemist, E & E, Seattle, Washington *BV*

SUBJ: **Inorganic Data Summary Check,  
Tuluksak River Site, Tuluksak, Alaska**

REF: TDD: 08-02-0017 PAN: 002233.0324.01SI

The data summary check of 13 soil samples collected from the Tuluksak River site located in Tuluksak, Alaska, has been completed. Mercury analyses (EPA CLP SOW ILM05.4) were performed by Chemtech Laboratory, Mountainside, New Jersey.

The samples were numbered:

MJAA84	MJAA85	MJAA86	MJAA87	MJAA95	MJAA96
MJAA97	MJAA98	MJAAB6	MJAAB7	MJAAB8	MJAAF7
MJAAF8					

No discrepancies were noted.





UNITED STATES ENVIRONMENTAL PROTECTION AGENCY  
REGION 10  
1200 Sixth Avenue, Suite 900  
Seattle, Washington 98101

December 5, 2008

Reply To  
Attn. Of: OEA-095

**MEMORANDUM**

SUBJECT: Data Validation for Tuluksak River SI,  
Case# 37825, SDG: MJAA87, Mercury Analyses

FROM: Jennifer Crawford, Chemist *Jennifer Crawford*  
Environmental Services Unit, OEA

TO: Brandon Perkins, Site Assessment Manager  
Office of Environmental Cleanup (ECL-112)

CC: Renee Nordeen, Ecology & Environment

The data validation of inorganic analyses for the above sample set is complete. Thirteen (13) soil samples were analyzed for mercury by Chemtech Laboratory, Mountainside, NJ. Sample numbers for this delivery group are:

MJAA84	MJAA85	MJAA86	MJAA87	MJAA95	MJAA96	MJAA97
MJAA98	MJAAB6	MJAAB7	MJAAB8	MJAAF7	MJAAF8	

**DATA QUALIFICATIONS**

The following comments refer to the lab's performance in meeting the specifications outlined in the "CLP Statement of Work (CLP-SOW) for Inorganic Analysis, rev. ILM05.4", the "USEPA CLP National Functional Guidelines for Inorganic Data Review" and the judgment of the reviewer. The comments presented herein are based on the information provided for the review.

**TIMELINESS - Acceptable**

No technical holding time requirements have been established for mercury in solid matrices. Samples were collected on 09/16/2008 and 09/17/2008. Mercury analysis (CV-AAS) was conducted on 10/23/2008.

**INSTRUMENT CALIBRATION/VERIFICATION - Acceptable**

A blank and five standards were analyzed for instrument calibration. The correlation coefficient (0.9999) was within the linearity criterion ( $\geq 0.995$ ). Recoveries for verification standards (96-103%) met the frequency (10%) and recovery (80-120%) criteria. Quantitation verification standards met both

the frequency and recovery criteria for all analytes.

#### **LABORATORY CONTROL SAMPLES (LCS) - Acceptable**

Analyte recoveries for the LCS were within the established control limits for solid samples.

#### **BLANKS – Acceptable**

Preparation and instrument control blanks were prepared and analyzed in accordance with method requirements. Detected blank results were below the quantitation limit.

#### **MATRIX SPIKE ANALYSIS – Acceptable**

A matrix spike analysis was performed for sample MJAAF7. Percent recovery was within the recovery criterion (75-125%).

#### **DUPLICATE SAMPLE ANALYSIS - Acceptable**

A duplicate sample analysis was performed for sample MJAAF7. Relative percent difference (RPD) was not calculated for the duplicate sample analysis, as both native and duplicate had non-detect results.

#### **ASSESSMENT SUMMARY**

The following is a summary of qualified data:

Sample results above the lab MDL and below the CRQL were qualified (JQ).

#### **DATA QUALIFIERS**

- U - The material was analyzed for, but was not detected above the level of the associated value. The associated value is either the sample quantitation limit or the sample detection limit.
- J - The associated value is an estimated quantity.
- R - The data are unusable. The analyte may or may not be present in the sample.
- UJ - The analyte was analyzed for, but was not detected. The associated value is an estimate and may be inaccurate or imprecise.

#### **PROJECT SPECIFIC DATA QUALIFIERS:**

- L - Low bias.
- H - High bias.
- K - Unknown Bias.
- Q - Detected concentration is below the method reporting limit / Contract Required Quantitation Limit, but is above the method detection limit.

## USEPA - CLP

1A-IN  
INORGANIC ANALYSIS DATA SHEET

EPA SAMPLE NO.

MJAA84

Lab Name: CHEMTECH CONSULTING GROUP Contract: EPW06047Lab Code: CHEM Case No.: 37825 NRAS No.: \_\_\_\_\_ SDG No.: MJAAB7Matrix: (soil/water) SOIL Lab Sample ID: Z5073-11Level: (low/med) LOW Date Received: 09/24/2008% Solids: 93.5 ✓Concentration Units (ug/L or mg/kg dry weight): MG/KG

CAS No.	Analyte	Concentration	C	Q	M
7429-90-5	Aluminum				NR
7440-36-0	Antimony				NR
7440-38-2	Arsenic				NR
7440-39-3	Barium				NR
7440-41-7	Beryllium				NR
7440-43-9	Cadmium				NR
7440-70-2	Calcium				NR
7440-47-3	Chromium				NR
7440-48-4	Cobalt				NR
7440-50-8	Copper				NR
7439-89-6	Iron				NR
7439-92-1	Lead				NR
7439-95-4	Magnesium				NR
7439-96-5	Manganese				NR
7439-97-6	Mercury	0.10 ✓	U		CV
7440-02-0	Nickel				NR
7440-09-7	Potassium				NR
7782-49-2	Selenium				NR
7440-22-4	Silver				NR
7440-23-5	Sodium				NR
7440-28-0	Thallium				NR
7440-62-2	Vanadium				NR
7440-66-6	Zinc				NR
57-12-5	Cyanide				NR

Color Before: BROWN

Clarity Before: \_\_\_\_\_

Texture: MEDIUMColor After: YELLOW

Clarity After: \_\_\_\_\_

Artifacts: \_\_\_\_\_

Comments:

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USEPA - CLP  
1A-IN  
INORGANIC ANALYSIS DATA SHEET

EPA SAMPLE NO.

MJAA85

Lab Name: CHEMTECH CONSULTING GROUP Contract: EPW06047

Lab Code: CHEM Case No.: 37825 NRAS No.: \_\_\_\_\_ SDG No.: MJAAB7

Matrix: (soil/water) SOIL Lab Sample ID: Z5073-02

Level: (low/med) LOW Date Received: 09/24/2008

% Solids: 93.7 ✓

Concentration Units (ug/L or mg/kg dry weight): MG/KG

CAS No.	Analyte	Concentration	C	Q	M
7429-90-5	Aluminum				NR
7440-36-0	Antimony				NR
7440-38-2	Arsenic				NR
7440-39-3	Barium				NR
7440-41-7	Beryllium				NR
7440-43-9	Cadmium				NR
7440-70-2	Calcium				NR
7440-47-3	Chromium				NR
7440-48-4	Cobalt				NR
7440-50-8	Copper				NR
7439-89-6	Iron				NR
7439-92-1	Lead				NR
7439-95-4	Magnesium				NR
7439-96-5	Manganese				NR
7439-97-6	Mercury	0.11 ✓	U		CV
7440-02-0	Nickel				NR
7440-09-7	Potassium				NR
7782-49-2	Selenium				NR
7440-22-4	Silver				NR
7440-23-5	Sodium				NR
7440-28-0	Thallium				NR
7440-62-2	Vanadium				NR
7440-66-6	Zinc				NR
57-12-5	Cyanide				NR

Color Before: BROWN Clarity Before: \_\_\_\_\_ Texture: MEDIUM

Color After: YELLOW Clarity After: \_\_\_\_\_ Artifacts: \_\_\_\_\_

Comments:

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## USEPA - CLP

1A-IN  
INORGANIC ANALYSIS DATA SHEET

EPA SAMPLE NO.

MJAA86

Lab Name: CHEMTECH CONSULTING GROUP Contract: EPW06047Lab Code: CHEM Case No.: 37825 NRAS No.: \_\_\_\_\_ SDG No.: MJAAB7Matrix: (soil/water) SOIL Lab Sample ID: Z5073-09Level: (low/med) LOW Date Received: 09/24/2008% Solids: 95.2 ✓Concentration Units (ug/L or mg/kg dry weight): MG/KG

CAS No.	Analyte	Concentration	C	Q	M
7429-90-5	Aluminum				NR
7440-36-0	Antimony				NR
7440-38-2	Arsenic				NR
7440-39-3	Barium				NR
7440-41-7	Beryllium				NR
7440-43-9	Cadmium				NR
7440-70-2	Calcium				NR
7440-47-3	Chromium				NR
7440-48-4	Cobalt				NR
7440-50-8	Copper				NR
7439-89-6	Iron				NR
7439-92-1	Lead				NR
7439-95-4	Magnesium				NR
7439-96-5	Manganese				NR
7439-97-6	Mercury	0.10 ✓	U		CV
7440-02-0	Nickel				NR
7440-09-7	Potassium				NR
7782-49-2	Selenium				NR
7440-22-4	Silver				NR
7440-23-5	Sodium				NR
7440-28-0	Thallium				NR
7440-62-2	Vanadium				NR
7440-66-6	Zinc				NR
57-12-5	Cyanide				NR

Color Before: BROWN Clarity Before: \_\_\_\_\_ Texture: MEDIUMColor After: YELLOW Clarity After: \_\_\_\_\_ Artifacts: \_\_\_\_\_

Comments:

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## USEPA - CLP

1A-IN  
INORGANIC ANALYSIS DATA SHEET

EPA SAMPLE NO.

MJAA87

Lab Name: CHEMTECH CONSULTING GROUP Contract: EPW06047Lab Code: CHEM Case No.: 37825 NRAS No.: \_\_\_\_\_ SDG No.: MJAAB7Matrix: (soil/water) SOIL Lab Sample ID: Z5073-03Level: (low/med) LOW Date Received: 09/24/2008% Solids: 79.3 ✓Concentration Units (ug/L or mg/kg dry weight): MG/KG

CAS No.	Analyte	Concentration	C	Q	M
7429-90-5	Aluminum				NR
7440-36-0	Antimony				NR
7440-38-2	Arsenic				NR
7440-39-3	Barium				NR
7440-41-7	Beryllium				NR
7440-43-9	Cadmium				NR
7440-70-2	Calcium				NR
7440-47-3	Chromium				NR
7440-48-4	Cobalt				NR
7440-50-8	Copper				NR
7439-89-6	Iron				NR
7439-92-1	Lead				NR
7439-95-4	Magnesium				NR
7439-96-5	Manganese				NR
7439-97-6	Mercury	0.13 ✓	U		CV
7440-02-0	Nickel				NR
7440-09-7	Potassium				NR
7782-49-2	Selenium				NR
7440-22-4	Silver				NR
7440-23-5	Sodium				NR
7440-28-0	Thallium				NR
7440-62-2	Vanadium				NR
7440-66-6	Zinc				NR
57-12-5	Cyanide				NR

Color Before: BROWN

Clarity Before: \_\_\_\_\_

Texture: MEDIUMColor After: YELLOW

Clarity After: \_\_\_\_\_

Artifacts: \_\_\_\_\_

Comments:

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## USEPA - CLP

1A-IN  
INORGANIC ANALYSIS DATA SHEET

EPA SAMPLE NO.

MJAA95

Lab Name: CHEMTECH CONSULTING GROUP Contract: EPW06047Lab Code: CHEM Case No.: 37825 NRAS No.: \_\_\_\_\_ SDG No.: MJAAB7Matrix: (soil/water) SOIL Lab Sample ID: Z5073-04Level: (low/med) LOW Date Received: 09/24/2008% Solids: 54.4 ✓Concentration Units (ug/L or mg/kg dry weight): MG/KG

CAS No.	Analyte	Concentration	C	Q	M
7429-90-5	Aluminum				NR
7440-36-0	Antimony				NR
7440-38-2	Arsenic				NR
7440-39-3	Barium				NR
7440-41-7	Beryllium				NR
7440-43-9	Cadmium				NR
7440-70-2	Calcium				NR
7440-47-3	Chromium				NR
7440-48-4	Cobalt				NR
7440-50-8	Copper				NR
7439-89-6	Iron				NR
7439-92-1	Lead				NR
7439-95-4	Magnesium				NR
7439-96-5	Manganese				NR
7439-97-6	Mercury	0.18 ✓	U		CV
7440-02-0	Nickel				NR
7440-09-7	Potassium				NR
7782-49-2	Selenium				NR
7440-22-4	Silver				NR
7440-23-5	Sodium				NR
7440-28-0	Thallium				NR
7440-62-2	Vanadium				NR
7440-66-6	Zinc				NR
57-12-5	Cyanide				NR

Color Before: BROWN

Clarity Before: \_\_\_\_\_

Texture: MEDIUMColor After: YELLOW

Clarity After: \_\_\_\_\_

Artifacts: \_\_\_\_\_

Comments:

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## USEPA - CLP

1A-IN  
INORGANIC ANALYSIS DATA SHEET

EPA SAMPLE NO.

MJAA96

Lab Name: CHEMTECH CONSULTING GROUP Contract: EPW06047Lab Code: CHEM Case No.: 37825 NRAS No.: \_\_\_\_\_ SDG No.: MJAAB7Matrix: (soil/water) SOILLab Sample ID: Z5073-05Level: (low/med) LOWDate Received: 09/24/2008% Solids: 92.1 ✓Concentration Units (ug/L or mg/kg dry weight): MG/KG

CAS No.	Analyte	Concentration	C	Q	M
7429-90-5	Aluminum				NR
7440-36-0	Antimony				NR
7440-38-2	Arsenic				NR
7440-39-3	Barium				NR
7440-41-7	Beryllium				NR
7440-43-9	Cadmium				NR
7440-70-2	Calcium				NR
7440-47-3	Chromium				NR
7440-48-4	Cobalt				NR
7440-50-8	Copper				NR
7439-89-6	Iron				NR
7439-92-1	Lead				NR
7439-95-4	Magnesium				NR
7439-96-5	Manganese				NR
7439-97-6	Mercury	0.11 ✓	U		CV
7440-02-0	Nickel				NR
7440-09-7	Potassium				NR
7782-49-2	Selenium				NR
7440-22-4	Silver				NR
7440-23-5	Sodium				NR
7440-28-0	Thallium				NR
7440-62-2	Vanadium				NR
7440-66-6	Zinc				NR
57-12-5	Cyanide				NR

Color Before: BROWN

Clarity Before: \_\_\_\_\_

Texture: MEDIUMColor After: YELLOW

Clarity After: \_\_\_\_\_

Artifacts: \_\_\_\_\_

Comments:

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## USEPA - CLP

1A-IN  
INORGANIC ANALYSIS DATA SHEET

EPA SAMPLE NO.

MJAA97

Lab Name: CHEMTECH CONSULTING GROUP Contract: EPW06047Lab Code: CHEM Case No.: 37825 NRAS No.: \_\_\_\_\_ SDG No.: MJAA97Matrix: (soil/water) SOIL Lab Sample ID: Z5073-06Level: (low/med) LOW Date Received: 09/24/2008% Solids: 91.8 ✓Concentration Units (ug/L or mg/kg dry weight): MG/KG

CAS No.	Analyte	Concentration	C	Q	M
7429-90-5	Aluminum				NR
7440-36-0	Antimony				NR
7440-38-2	Arsenic				NR
7440-39-3	Barium				NR
7440-41-7	Beryllium				NR
7440-43-9	Cadmium				NR
7440-70-2	Calcium				NR
7440-47-3	Chromium				NR
7440-48-4	Cobalt				NR
7440-50-8	Copper				NR
7439-89-6	Iron				NR
7439-92-1	Lead				NR
7439-95-4	Magnesium				NR
7439-96-5	Manganese				NR
7439-97-6	Mercury	0.11 ✓	U		CV
7440-02-0	Nickel				NR
7440-09-7	Potassium				NR
7782-49-2	Selenium				NR
7440-22-4	Silver				NR
7440-23-5	Sodium				NR
7440-28-0	Thallium				NR
7440-62-2	Vanadium				NR
7440-66-6	Zinc				NR
57-12-5	Cyanide				NR

Color Before: BROWN

Clarity Before: \_\_\_\_\_

Texture: MEDIUMColor After: YELLOW

Clarity After: \_\_\_\_\_

Artifacts: \_\_\_\_\_

Comments:

11/24/08

## USEPA - CLP

1A-IN  
INORGANIC ANALYSIS DATA SHEET

EPA SAMPLE NO.

MJAA98

Lab Name: CHEMTECH CONSULTING GROUP Contract: EPW06047Lab Code: CHEM Case No.: 37825 NRAS No.: \_\_\_\_\_ SDG No.: MJAAB7Matrix: (soil/water) SOIL Lab Sample ID: Z5073-07Level: (low/med) LOW Date Received: 09/24/2008% Solids: 91.7 ✓Concentration Units (ug/L or mg/kg dry weight): MG/KG

CAS No.	Analyte	Concentration	C	Q	M
7429-90-5	Aluminum				NR
7440-36-0	Antimony				NR
7440-38-2	Arsenic				NR
7440-39-3	Barium				NR
7440-41-7	Beryllium				NR
7440-43-9	Cadmium				NR
7440-70-2	Calcium				NR
7440-47-3	Chromium				NR
7440-48-4	Cobalt				NR
7440-50-8	Copper				NR
7439-89-6	Iron				NR
7439-92-1	Lead				NR
7439-95-4	Magnesium				NR
7439-96-5	Manganese				NR
7439-97-6	Mercury	0.11 ✓	U		CV
7440-02-0	Nickel				NR
7440-09-7	Potassium				NR
7782-49-2	Selenium				NR
7440-22-4	Silver				NR
7440-23-5	Sodium				NR
7440-28-0	Thallium				NR
7440-62-2	Vanadium				NR
7440-66-6	Zinc				NR
57-12-5	Cyanide				NR

Color Before: BROWN

Clarity Before: \_\_\_\_\_

Texture: MEDIUMColor After: YELLOW

Clarity After: \_\_\_\_\_

Artifacts: \_\_\_\_\_

Comments: \_\_\_\_\_

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11/24/08

## USEPA - CLP

IA-IN  
INORGANIC ANALYSIS DATA SHEET

EPA SAMPLE NO.

MJAAB6

Lab Name: CHEMTECH CONSULTING GROUP Contract: EPW06047Lab Code: CHEM Case No.: 37825 NRAS No.: \_\_\_\_\_ SDG No.: MJAAB7Matrix: (soil/water) SOIL Lab Sample ID: Z5073-08Level: (low/med) LOW Date Received: 09/24/2008% Solids: 86.6 ✓Concentration Units (ug/L or mg/kg dry weight): MG/KG

CAS No.	Analyte	Concentration	C	Q	M
7429-90-5	Aluminum				NR
7440-36-0	Antimony				NR
7440-38-2	Arsenic				NR
7440-39-3	Barium				NR
7440-41-7	Beryllium				NR
7440-43-9	Cadmium				NR
7440-70-2	Calcium				NR
7440-47-3	Chromium				NR
7440-48-4	Cobalt				NR
7440-50-8	Copper				NR
7439-89-6	Iron				NR
7439-92-1	Lead				NR
7439-95-4	Magnesium				NR
7439-96-5	Manganese				NR
7439-97-6	Mercury	0.12 ✓	U		CV
7440-02-0	Nickel				NR
7440-09-7	Potassium				NR
7782-49-2	Selenium				NR
7440-22-4	Silver				NR
7440-23-5	Sodium				NR
7440-28-0	Thallium				NR
7440-62-2	Vanadium				NR
7440-66-6	Zinc				NR
57-12-5	Cyanide				NR

Color Before: BROWN

Clarity Before: \_\_\_\_\_

Texture: MEDIUMColor After: YELLOW

Clarity After: \_\_\_\_\_

Artifacts: \_\_\_\_\_

Comments:

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USEPA - CLP  
1A-IN  
INORGANIC ANALYSIS DATA SHEET

EPA SAMPLE NO.

MJAAB7

Lab Name: CHEMTECH CONSULTING GROUP Contract: EPW06047

Lab Code: CHEM Case No.: 37825 NRAS No.: \_\_\_\_\_ SDG No.: MJAAB7

Matrix: (soil/water) SOIL Lab Sample ID: Z5073-01

Level: (low/med) LOW Date Received: 09/24/2008

% Solids: 84.0 ✓

Concentration Units (ug/L or mg/kg dry weight): MG/KG

CAS No.	Analyte	Concentration	C	Q	M
7429-90-5	Aluminum				NR
7440-36-0	Antimony				NR
7440-38-2	Arsenic				NR
7440-39-3	Barium				NR
7440-41-7	Beryllium				NR
7440-43-9	Cadmium				NR
7440-70-2	Calcium				NR
7440-47-3	Chromium				NR
7440-48-4	Cobalt				NR
7440-50-8	Copper				NR
7439-89-6	Iron				NR
7439-92-1	Lead				NR
7439-95-4	Magnesium				NR
7439-96-5	Manganese				NR
7439-97-6	Mercury	0.12 ✓	U		CV
7440-02-0	Nickel				NR
7440-09-7	Potassium				NR
7782-49-2	Selenium				NR
7440-22-4	Silver				NR
7440-23-5	Sodium				NR
7440-28-0	Thallium				NR
7440-62-2	Vanadium				NR
7440-66-6	Zinc				NR
57-12-5	Cyanide				NR

Color Before: BROWN Clarity Before: \_\_\_\_\_ Texture: MEDIUM

Color After: YELLOW Clarity After: \_\_\_\_\_ Artifacts: \_\_\_\_\_

Comments:

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*11/24/08*

## USEPA - CLP

1A-IN  
INORGANIC ANALYSIS DATA SHEET

EPA SAMPLE NO.

MJAAB8

Lab Name: CHEMTECH CONSULTING GROUP Contract: EPW06047Lab Code: CHEM Case No.: 37825 NRAS No.: \_\_\_\_\_ SDG No.: MJAAB7Matrix: (soil/water) SOIL Lab Sample ID: Z5073-10Level: (low/med) LOW Date Received: 09/24/2008% Solids: 74.5 ✓Concentration Units (ug/L or mg/kg dry weight): MG/KG

CAS No.	Analyte	Concentration	C	Q	M
7429-90-5	Aluminum				NR
7440-36-0	Antimony				NR
7440-38-2	Arsenic				NR
7440-39-3	Barium				NR
7440-41-7	Beryllium				NR
7440-43-9	Cadmium				NR
7440-70-2	Calcium				NR
7440-47-3	Chromium				NR
7440-48-4	Cobalt				NR
7440-50-8	Copper				NR
7439-89-6	Iron				NR
7439-92-1	Lead				NR
7439-95-4	Magnesium				NR
7439-96-5	Manganese				NR
7439-97-6	Mercury	0.088 ✓	+	JQ	CV
7440-02-0	Nickel				NR
7440-09-7	Potassium				NR
7782-49-2	Selenium				NR
7440-22-4	Silver				NR
7440-23-5	Sodium				NR
7440-28-0	Thallium				NR
7440-62-2	Vanadium				NR
7440-66-6	Zinc				NR
57-12-5	Cyanide				NR

Color Before: BROWN Clarity Before: \_\_\_\_\_ Texture: MEDIUMColor After: YELLOW Clarity After: \_\_\_\_\_ Artifacts: \_\_\_\_\_

Comments:

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## USEPA - CLP

1A-IN  
INORGANIC ANALYSIS DATA SHEET

EPA SAMPLE NO.

MJAAF7

Lab Name: CHEMTECH CONSULTING GROUP Contract: EPW06047Lab Code: CHEM Case No.: 37825 NRAS No.: \_\_\_\_\_ SDG No.: MJAAB7Matrix: (soil/water) SOIL Lab Sample ID: Z5073-13Level: (low/med) LOW Date Received: 09/24/2008% Solids: 42.9 ✓Concentration Units (ug/L or mg/kg dry weight): MG/KG

CAS No.	Analyte	Concentration	C	Q	M
7429-90-5	Aluminum				NR
7440-36-0	Antimony				NR
7440-38-2	Arsenic				NR
7440-39-3	Barium				NR
7440-41-7	Beryllium				NR
7440-43-9	Cadmium				NR
7440-70-2	Calcium				NR
7440-47-3	Chromium				NR
7440-48-4	Cobalt				NR
7440-50-8	Copper				NR
7439-89-6	Iron				NR
7439-92-1	Lead				NR
7439-95-4	Magnesium				NR
7439-96-5	Manganese				NR
7439-97-6	Mercury	0.23 ✓	U		CV
7440-02-0	Nickel				NR
7440-09-7	Potassium				NR
7782-49-2	Selenium				NR
7440-22-4	Silver				NR
7440-23-5	Sodium				NR
7440-28-0	Thallium				NR
7440-62-2	Vanadium				NR
7440-66-6	Zinc				NR
57-12-5	Cyanide				NR

Color Before: BROWN

Clarity Before: \_\_\_\_\_

Texture: MEDIUMColor After: YELLOW

Clarity After: \_\_\_\_\_

Artifacts: \_\_\_\_\_

Comments:

## USEPA - CLP

1A-IN  
INORGANIC ANALYSIS DATA SHEET

EPA SAMPLE NO.

MJAAP8

Lab Name: CHEMTECH CONSULTING GROUP Contract: EPW06047Lab Code: CHEM Case No.: 37825 NRAS No.: \_\_\_\_\_ SDG No.: MJAAB7Matrix: (soil/water) SOIL Lab Sample ID: Z5073-12Level: (low/med) LOW Date Received: 09/24/2008% Solids: 45.4Concentration Units (ug/L or mg/kg dry weight): MG/KG

CAS No.	Analyte	Concentration	C	Q	M
7429-90-5	Aluminum				NR
7440-36-0	Antimony				NR
7440-38-2	Arsenic				NR
7440-39-3	Barium				NR
7440-41-7	Beryllium				NR
7440-43-9	Cadmium				NR
7440-70-2	Calcium				NR
7440-47-3	Chromium				NR
7440-48-4	Cobalt				NR
7440-50-8	Copper				NR
7439-89-6	Iron				NR
7439-92-1	Lead				NR
7439-95-4	Magnesium				NR
7439-96-5	Manganese				NR
7439-97-6	Mercury	0.095 ✓	J	JQ	CV
7440-02-0	Nickel				NR
7440-09-7	Potassium				NR
7782-49-2	Selenium				NR
7440-22-4	Silver				NR
7440-23-5	Sodium				NR
7440-28-0	Thallium				NR
7440-62-2	Vanadium				NR
7440-66-6	Zinc				NR
57-12-5	Cyanide				NR

Color Before: BROWN Clarity Before: \_\_\_\_\_ Texture: MEDIUMColor After: YELLOW Clarity After: \_\_\_\_\_ Artifacts: \_\_\_\_\_

Comments:

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J 11/24/08  
 J 12/15/08




# ecology and environment, inc.

International Specialists in the Environment

720 Third Avenue, Suite 1700, Seattle, WA 98104  
Tel: (206) 624-9537, Fax: (206) 621-9832

## MEMORANDUM

DATE: October 20, 2008  
TO: Mark Woodke, Project Manager, E & E, Seattle, Washington  
FROM: David Ikeda, Chemist, E & E, Seattle, Washington   
SUBJ: **Inorganic Data Summary Check, Tuluksak River Site Inspection,  
Tuluksak, Alaska**  
REF: TDD: 08-02-0007 PAN: 002233.0324.01SI

The data quality assurance summary check of 13 soil samples collected from the Tuluksak River in Tuluksak, Alaska has been completed. Inorganic analyses (EPA CLP SOW ILM05.4) were performed by Chemtech, Mountainside, New Jersey.

The samples were numbered:

MJAA84	MJAA95	MJAA98	MJAAB8
MJAA85	MJAA96	MJAAB6	MJAAB7
MJAA86	MJAA97	MJAAB7	MJAAB8
MJAA87			

No discrepancies were noted. The secondary reviewer added "Q" bias qualifiers to positive sample results less than the contract required detection limit. For "Q" bias results, the secondary reviewer removed any qualifiers that the primary reviewer may have added.





UNITED STATES ENVIRONMENTAL PROTECTION AGENCY  
REGION 10  
1200 Sixth Avenue, Suite 900  
Seattle, Washington 98101

October 15, 2008

Reply To  
Attn. Of: OEA-095

MEMORANDUM

SUBJECT: Data Validation for Tuluksak River Site Inspection,  
Case# 37825, SDG: MJAAAB6, Inorganic Analysis

FROM: Donald Matheny, Chemist *DM*  
Environmental Services Unit, OEA

TO: Brandon Perkins, Site Assessment Manager  
Office of Environmental Cleanup (ECL-112)

CC: Renee Nordeen, Ecology & Environment

The data validation of inorganic analyses for the above sample set is complete. Thirteen (13) soil samples were analyzed for total elements by Chemtech, Mountainside, NJ. Sample numbers for this delivery group are as follows:

MJAA84	MJAA85	MJAA86	MJAA87	MJAA95	MJAA96	MJAA97
MJAA98	MJAAB6	MJAAB7	MJAAB8	MJAAF7	MJAAF8	

**DATA QUALIFICATIONS**

The following comments refer to the lab's performance in meeting the specifications outlined in the "CLP Statement of Work (CLP-SOW) for Inorganic Analysis, rev. ILM05.4", the "USEPA Contract Laboratory Program National Functional Guidelines for Inorganic Data Review" and the judgment of the reviewer. The comments presented herein are based on the information provided for the review.

**TIMELINESS - Acceptable**

The holding time from the date of collection to the date of digestion and analyses were met for all elements (180 days). Samples were collected on 9/16/08 and 9/17/08. ICP-AES analysis was conducted on 10/6/08.

#### INSTRUMENT CALIBRATION/VERIFICATION - Acceptable

For ICP-AES analysis, instrument calibration was performed in accordance with method requirements. Recoveries for instrument verification standards (91-108%) met the frequency (10%) and recovery (90-110%).

Quantitation verification standards met both the frequency and recovery criteria for all elements.

#### ICP-AES INTERFERENCE CHECK SAMPLE (ICS) - Acceptable

An ICS was analyzed at the required frequency for each analytical run. ICS recoveries met the recovery criterion (80-120% or  $\pm 2 \times \text{CRDL}$ ) for all elements.

#### LABORATORY CONTROL SAMPLES (LCS) - Acceptable

An aqueous Laboratory Control Sample was digested and analyzed. Percent recoveries (98-106%) were within the control limits (80-120%).

#### BLANKS - Acceptable

Preparation and instrument control blanks were prepared and analyzed in accordance with method requirements. Blanks were not detected at concentrations that impact sample values.

#### MATRIX SPIKE ANALYSIS

A matrix spike was analyzed for sample MJAAF7. Percent recoveries (87-120%) met the criterion (75-125%) for all elements with the exception of silver (47%). Silver data were qualified (JL or UJL) and may be biased low.

#### DUPLICATE SAMPLE ANALYSIS - Acceptable

A duplicate sample was analyzed for sample MJAAF7. Relative percent differences ( $\leq 3\%$ ) met the control limits ( $\pm 35\%$  or  $\pm 2 \times \text{CRQL}$ ) for soils.

#### ICP-AES SERIAL DILUTION

A five-fold serial dilution was analyzed for sample MJAAF7. Percent differences ( $\leq 11\%$ ) were within the 1% allowable variance from the acceptance criteria ( $\leq 10\%$ ) for all applicable elements with the exception of iron (13%), magnesium (12%), manganese (12%) and zinc (16%). Data for these elements were qualified (JL) and may be biased low.

## ASSESSMENT SUMMARY

The following is a summary of qualified data:

Silver data were qualified (JL or UJL) due to a low matrix spike recovery. Silver values may be biased low.

Iron, magnesium, manganese and zinc data were qualified (JL) due to high percent differences in the serial dilution results. Values for these elements may be biased low.

## DATA QUALIFIERS

- U - The material was analyzed for, but was not detected above the level of the associated value. The associated value is either the sample quantitation limit or the sample detection limit.
- J - The associated value is an estimated quantity.
- R - The data are unusable. The analyte may or may not be present in the sample.
- UJ - The analyte was analyzed for, but was not detected. The associated value is an estimate and may be inaccurate or imprecise.

## PROJECT SPECIFIC DATA QUALIFIERS:

- L - Low bias.
- H - High bias.
- K - Unknown Bias.
- Q - Detected concentration is below the method reporting limit / Contract Required Quantitation Limit, but is above the method detection limit.

## USEPA - CLP

1A-IN  
INORGANIC ANALYSIS DATA SHEET

EPA SAMPLE NO.

MJAA84

Lab Name: CHEMTECH CONSULTING GROUP Contract: EPW06047Lab Code: CHEM Case No.: 37825 NRAS No.: \_\_\_\_\_ SDG No.: MJAAB6Matrix: (soil/water) SOILLab Sample ID: Z4666-11Level: (low/med) LOWDate Received: 09/24/2008% Solids: 93.5Concentration Units (ug/L or mg/kg dry weight): MG/KG

CAS No.	Analyte	Concentration	C	Q	M
7429-90-5	Aluminum	7670			P
7440-36-0	Antimony	6.4	U		P
7440-38-2	Arsenic	3.9			P
7440-39-3	Barium	61.3			P
7440-41-7	Beryllium	0.14	JQ		P
7440-43-9	Cadmium	0.48	JQ		P
7440-70-2	Calcium	1400		E	P
7440-47-3	Chromium	5.1			P
7440-48-4	Cobalt	5.9		E	P
7440-50-8	Copper	10.8		E	P
7439-89-6	Iron	9770		E JL	P
7439-92-1	Lead	4.2			P
7439-95-4	Magnesium	2190		E JL	P
7439-96-5	Manganese	149		E JL	P
7439-97-6	Mercury				NR
7440-02-0	Nickel	4.2	JQ		P
7440-09-7	Potassium	1500			P
7782-49-2	Selenium	3.7	U		P
7440-22-4	Silver	1.1	U	# UJL	P
7440-23-5	Sodium	80.9	JQ		P
7440-28-0	Thallium	2.7	U		P
7440-62-2	Vanadium	30.9			P
7440-66-6	Zinc	24.4		E JL	P
57-12-5	Cyanide				NR

Color Before: BROWN

Clarity Before: \_\_\_\_\_

Texture: MEDIUMColor After: YELLOW

Clarity After: \_\_\_\_\_

Artifacts: \_\_\_\_\_

Comments:

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## USEPA - CLP

1A-IN  
INORGANIC ANALYSIS DATA SHEET

EPA SAMPLE NO.

MJAA85

Lab Name: CHEMTECH CONSULTING GROUP Contract: EPW06047Lab Code: CHEM Case No.: 37825 NRAS No.: \_\_\_\_\_ SDG No.: MJAAB6Matrix: (soil/water) SOIL Lab Sample ID: Z4666-01Level: (low/med) LOW Date Received: 09/24/2008% Solids: 93.7Concentration Units (ug/L or mg/kg dry weight): MG/KG

CAS No.	Analyte	Concentration	C	Q	M
7429-90-5	Aluminum	9250			P
7440-36-0	Antimony	0.72	JQ		P
7440-38-2	Arsenic	6.9			P
7440-39-3	Barium	31.6			P
7440-41-7	Beryllium	0.19	JQ		P
7440-43-9	Cadmium	1.5			P
7440-70-2	Calcium	1730		E	P
7440-47-3	Chromium	1.6			P
7440-48-4	Cobalt	4.3	JQ	E	P
7440-50-8	Copper	7.8		E	P
7439-89-6	Iron	28100		E JL	P
7439-92-1	Lead	13.2			P
7439-95-4	Magnesium	2320		E JL	P
7439-96-5	Manganese	407		E JL	P
7439-97-6	Mercury				NR
7440-02-0	Nickel	1.3	JQ		P
7440-09-7	Potassium	1500			P
7782-49-2	Selenium	3.7	U		P
7440-22-4	Silver	0.13	J	JQ # JK	P
7440-23-5	Sodium	128	JQ		P
7440-28-0	Thallium	2.7	U		P
7440-62-2	Vanadium	22.6			P
7440-66-6	Zinc	62.0		E JL	P
57-12-5	Cyanide				NR

Color Before: BROWN Clarity Before: \_\_\_\_\_ Texture: MEDIUMColor After: YELLOW Clarity After: \_\_\_\_\_ Artifacts: \_\_\_\_\_

Comments:

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## USEPA - CLP

1A-IN  
INORGANIC ANALYSIS DATA SHEET

EPA SAMPLE NO.

MJAA86

Lab Name: CHEMTECH CONSULTING GROUP Contract: EPW06047Lab Code: CHEM Case No.: 37825 NRAS No.: \_\_\_\_\_ SDG No.: MJAAB6Matrix: (soil/water) SOIL Lab Sample ID: Z4666-02Level: (low/med) LOW Date Received: 09/24/2008% Solids: 95.2Concentration Units (ug/L or mg/kg dry weight): MG/KG

CAS No.	Analyte	Concentration	C	Q	M
7429-90-5	Aluminum	11000			P
7440-36-0	Antimony	6.3	U		P
7440-38-2	Arsenic	19.4			P
7440-39-3	Barium	28.2			P
7440-41-7	Beryllium	0.23	JQ		P
7440-43-9	Cadmium	1.2			P
7440-70-2	Calcium	1520		E	P
7440-47-3	Chromium	5.6			P
7440-48-4	Cobalt	5.2	JQ	E	P
7440-50-8	Copper	13.7		E	P
7439-89-6	Iron	22200		E JL	P
7439-92-1	Lead	12.9			P
7439-95-4	Magnesium	4100		E JL	P
7439-96-5	Manganese	319		E JL	P
7439-97-6	Mercury				NR
7440-02-0	Nickel	5.3			P
7440-09-7	Potassium	2130			P
7782-49-2	Selenium	3.7	U		P
7440-22-4	Silver	1.1	E	H UJL	P
7440-23-5	Sodium	138	JQ		P
7440-28-0	Thallium	2.6	U		P
7440-62-2	Vanadium	18.4			P
7440-66-6	Zinc	56.2		E JL	P
57-12-5	Cyanide				NR

Color Before: BROWN Clarity Before: \_\_\_\_\_ Texture: MEDIUMColor After: YELLOW Clarity After: \_\_\_\_\_ Artifacts: \_\_\_\_\_

Comments:

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## USEPA - CLP

1A-IN  
INORGANIC ANALYSIS DATA SHEET

EPA SAMPLE NO.

MJAA87

Lab Name: CHEMTECH CONSULTING GROUP Contract: EPW06047Lab Code: CHEM Case No.: 37825 NRAS No.: \_\_\_\_\_ SDG No.: MJAAB6Matrix: (soil/water) SOIL Lab Sample ID: Z4666-03Level: (low/med) LOW Date Received: 09/24/2008% Solids: 79.3Concentration Units (ug/L or mg/kg dry weight): MG/KG

CAS No.	Analyte	Concentration	C	Q	M
7429-90-5	Aluminum	11700			P
7440-36-0	Antimony	7.5	U		P
7440-38-2	Arsenic	5.2			P
7440-39-3	Barium	48.2			P
7440-41-7	Beryllium	0.22	JQ		P
7440-43-9	Cadmium	1.2			P
7440-70-2	Calcium	2310		<del>P</del>	P
7440-47-3	Chromium	17.8			P
7440-48-4	Cobalt	9.7		<del>X</del>	P
7440-50-8	Copper	18.6		<del>P</del>	P
7439-89-6	Iron	23400		<del>P</del> JL	P
7439-92-1	Lead	5.7			P
7439-95-4	Magnesium	5570		<del>P</del> JL	P
7439-96-5	Manganese	293		<del>P</del> JL	P
7439-97-6	Mercury				NR
7440-02-0	Nickel	14.2			P
7440-09-7	Potassium	823			P
7782-49-2	Selenium	4.4	U		P
7440-22-4	Silver	1.2	<del>P</del>	<del>X</del> UJL	P
7440-23-5	Sodium	154	JQ		P
7440-28-0	Thallium	3.1	U		P
7440-62-2	Vanadium	50.4			P
7440-66-6	Zinc	52.4		<del>P</del> JL	P
57-12-5	Cyanide				NR

Color Before: BROWN Clarity Before: \_\_\_\_\_ Texture: MEDIUMColor After: YELLOW Clarity After: \_\_\_\_\_ Artifacts: \_\_\_\_\_

Comments:

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## USEPA - CLP

1A-IN  
INORGANIC ANALYSIS DATA SHEET

EPA SAMPLE NO.

MJAA95

Lab Name: CHEMTECH CONSULTING GROUP Contract: EPW06047Lab Code: CHEM Case No.: 37825 NRAS No.: \_\_\_\_\_ SDG No.: MJAAB6Matrix: (soil/water) SOIL Lab Sample ID: Z4666-04Level: (low/med) LOW Date Received: 09/24/2008% Solids: 54.4Concentration Units (ug/L or mg/kg dry weight): MG/KG

CAS No.	Analyte	Concentration	C	Q	M
7429-90-5	Aluminum	33000			P
7440-36-0	Antimony	10.8	U		P
7440-38-2	Arsenic	17.1			P
7440-39-3	Barium	273			P
7440-41-7	Beryllium	0.44	JQ		P
7440-43-9	Cadmium	2.5			P
7440-70-2	Calcium	6690		E	P
7440-47-3	Chromium	21.5			P
7440-48-4	Cobalt	22.0		E	P
7440-50-8	Copper	63.4		E	P
7439-89-6	Iron	41800		E JL	P
7439-92-1	Lead	14.4			P
7439-95-4	Magnesium	10500		E JL	P
7439-96-5	Manganese	987		E JL	P
7439-97-6	Mercury				NR
7440-02-0	Nickel	16.6			P
7440-09-7	Potassium	1870			P
7782-49-2	Selenium	6.3	U		P
7440-22-4	Silver	0.26	J	JQ H JK	P
7440-23-5	Sodium	377	JQ		P
7440-28-0	Thallium	4.5	U		P
7440-62-2	Vanadium	120			P
7440-66-6	Zinc	98.5		E JL	P
57-12-5	Cyanide				NR

Color Before: BROWN

Clarity Before: \_\_\_\_\_

Texture: MEDIUMColor After: YELLOW

Clarity After: \_\_\_\_\_

Artifacts: \_\_\_\_\_

Comments:

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## USEPA - CLP

1A-IN  
INORGANIC ANALYSIS DATA SHEET

EPA SAMPLE NO.

MJAA96

Lab Name: CHEMTECH CONSULTING GROUP Contract: EPW06047Lab Code: CHEM Case No.: 37825 NRAS No.: \_\_\_\_\_ SDG No.: MJAAB6Matrix: (soil/water) SOIL Lab Sample ID: Z4666-05Level: (low/med) LOW Date Received: 09/24/2008% Solids: 92.1Concentration Units (ug/L or mg/kg dry weight): MG/KG

CAS No.	Analyte	Concentration	C	Q	M
7429-90-5	Aluminum	17300			P
7440-36-0	Antimony	6.5	U		P
7440-38-2	Arsenic	11.9			P
7440-39-3	Barium	88.8			P
7440-41-7	Beryllium	0.31	JQ		P
7440-43-9	Cadmium	2.1			P
7440-70-2	Calcium	2200		E	P
7440-47-3	Chromium	18.1			P
7440-48-4	Cobalt	13.4		E	P
7440-50-8	Copper	65.2		E	P
7439-89-6	Iron	37000		E JL	P
7439-92-1	Lead	10.0			P
7439-95-4	Magnesium	9510		E JL	P
7439-96-5	Manganese	480		E JL	P
7439-97-6	Mercury				NR
7440-02-0	Nickel	11.8			P
7440-09-7	Potassium	527	JQ		P
7782-49-2	Selenium	3.8	U		P
7440-22-4	Silver	0.25	J	JQ + JL	P
7440-23-5	Sodium	134	JQ		P
7440-28-0	Thallium	2.7	U		P
7440-62-2	Vanadium	83.7			P
7440-66-6	Zinc	44.9		E JL	P
57-12-5	Cyanide				NR

Color Before: BROWN Clarity Before: \_\_\_\_\_ Texture: MEDIUMColor After: YELLOW Clarity After: \_\_\_\_\_ Artifacts: \_\_\_\_\_

Comments:

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## USEPA - CLP

1A-IN  
INORGANIC ANALYSIS DATA SHEET

EPA SAMPLE NO.

MJAA97

Lab Name: CHEMTECH CONSULTING GROUP Contract: EPW06047Lab Code: CHEM Case No.: 37825 NRAS No.: \_\_\_\_\_ SDG No.: MJAAB6Matrix: (soil/water) SOILLab Sample ID: Z4666-06Level: (low/med) LOWDate Received: 09/24/2008% Solids: 91.8Concentration Units (ug/L or mg/kg dry weight): MG/KG

CAS No.	Analyte	Concentration	C	Q	M
7429-90-5	Aluminum	19000			P
7440-36-0	Antimony	6.5	U		P
7440-38-2	Arsenic	10.3			P
7440-39-3	Barium	99.8			P
7440-41-7	Beryllium	0.27	JQ		P
7440-43-9	Cadmium	1.8			P
7440-70-2	Calcium	2520		E	P
7440-47-3	Chromium	12.3			P
7440-48-4	Cobalt	14.6		E	P
7440-50-8	Copper	51.4		E	P
7439-89-6	Iron	34000		E JL	P
7439-92-1	Lead	5.2			P
7439-95-4	Magnesium	11100		E JL	P
7439-96-5	Manganese	514		E JL	P
7439-97-6	Mercury				NR
7440-02-0	Nickel	12.1			P
7440-09-7	Potassium	534	JQ		P
7782-49-2	Selenium	3.8	U		P
7440-22-4	Silver	0.22	J	JQ * JK	P
7440-23-5	Sodium	137	JQ		P
7440-28-0	Thallium	2.7	U		P
7440-62-2	Vanadium	79.7			P
7440-66-6	Zinc	45.0		E JL	P
57-12-5	Cyanide				NR

Color Before: BROWN

Clarity Before: \_\_\_\_\_

Texture: MEDIUMColor After: YELLOW

Clarity After: \_\_\_\_\_

Artifacts: \_\_\_\_\_

Comments:

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## USEPA - CLP

1A-IN  
INORGANIC ANALYSIS DATA SHEET

EPA SAMPLE NO.

MJAA98

Lab Name: CHEMTECH CONSULTING GROUP Contract: EPW06047Lab Code: CHEM Case No.: 37825 NRAS No.: \_\_\_\_\_ SDG No.: MJAAB6Matrix: (soil/water) SOILLab Sample ID: Z4666-07Level: (low/med) LOWDate Received: 09/24/2008% Solids: 91.7Concentration Units (ug/L or mg/kg dry weight): MG/KG

CAS No.	Analyte	Concentration	C	Q	M
7429-90-5	Aluminum	18200			P
7440-36-0	Antimony	6.5	U		P
7440-38-2	Arsenic	8.2			P
7440-39-3	Barium	91.3			P
7440-41-7	Beryllium	0.23	JQ		P
7440-43-9	Cadmium	1.7			P
7440-70-2	Calcium	2290		<del>E</del>	P
7440-47-3	Chromium	13.7			P
7440-48-4	Cobalt	13.9		<del>E</del>	P
7440-50-8	Copper	39.6		<del>E</del>	P
7439-89-6	Iron	33000		<del>E</del> JL	P
7439-92-1	Lead	4.1			P
7439-95-4	Magnesium	10200		<del>E</del> JL	P
7439-96-5	Manganese	457		<del>E</del> JL	P
7439-97-6	Mercury				NR
7440-02-0	Nickel	9.8			P
7440-09-7	Potassium	495	JQ		P
7782-49-2	Selenium	3.8	U		P
7440-22-4	Silver	0.22	J	JQ * JL	P
7440-23-5	Sodium	190	JQ		P
7440-28-0	Thallium	2.7	U		P
7440-62-2	Vanadium	75.3			P
7440-66-6	Zinc	40.8		<del>E</del> JL	P
57-12-5	Cyanide				NR

Color Before: BROWN

Clarity Before: \_\_\_\_\_

Texture: MEDIUMColor After: YELLOW

Clarity After: \_\_\_\_\_

Artifacts: \_\_\_\_\_

Comments:

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## USEPA - CLP

1A-IN  
INORGANIC ANALYSIS DATA SHEET

EPA SAMPLE NO.

MJAAB6

Lab Name: CHEMTECH CONSULTING GROUP Contract: EPW06047Lab Code: CHEM Case No.: 37825 NRAS No.: \_\_\_\_\_ SDG No.: MJAAB6Matrix: (soil/water) SOILLab Sample ID: Z4666-08Level: (low/med) LOWDate Received: 09/24/2008% Solids: 86.6Concentration Units (ug/L or mg/kg dry weight): MG/KG

CAS No.	Analyte	Concentration	C	Q	M
7429-90-5	Aluminum	29300			P
7440-36-0	Antimony	6.8	U		P
7440-38-2	Arsenic	11.9			P
7440-39-3	Barium	229			P
7440-41-7	Beryllium	0.72			P
7440-43-9	Cadmium	2.1			P
7440-70-2	Calcium	3350		<del>E</del>	P
7440-47-3	Chromium	6.9			P
7440-48-4	Cobalt	10.8		<del>E</del>	P
7440-50-8	Copper	24.3		<del>E</del>	P
7439-89-6	Iron	31700		<del>E</del> JL	P
7439-92-1	Lead	9.7			P
7439-95-4	Magnesium	11600		<del>E</del> JL	P
7439-96-5	Manganese	761		<del>E</del> JL	P
7439-97-6	Mercury				NR
7440-02-0	Nickel	5.4			P
7440-09-7	Potassium	10700			P
7782-49-2	Selenium	4.0	U		P
7440-22-4	Silver	0.19	<del>F</del>	<del>5Q</del> <del>JK</del>	P
7440-23-5	Sodium	226	JQ		P
7440-28-0	Thallium	2.8	U		P
7440-62-2	Vanadium	72.4			P
7440-66-6	Zinc	65.6		<del>E</del> JL	P
57-12-5	Cyanide				NR

Color Before: BROWN

Clarity Before: \_\_\_\_\_

Texture: MEDIUMColor After: YELLOW

Clarity After: \_\_\_\_\_

Artifacts: \_\_\_\_\_

Comments:

## USEPA - CLP

1A-IN  
INORGANIC ANALYSIS DATA SHEET

EPA SAMPLE NO.

MJAAB7

Lab Name CHEMTECH CONSULTING GROUP Contract: EPW06047Lab Code: CHEM Case No.: 37825 NRAS No.: \_\_\_\_\_ SDG No.: MJAAB6Matrix: (soil/water) SOILLab Sample ID: Z4666-09Level: (low/med) LOWDate Received: 09/24/2008% Solids: 84.0Concentration Units (ug/L or mg/kg dry weight): MG/KG

CAS No.	Analyte	Concentration	C	Q	M
7429-90-5	Aluminum	3290			P
7440-36-0	Antimony	7.1	U		P
7440-38-2	Arsenic	31.2			P
7440-39-3	Barium	99.0			P
7440-41-7	Beryllium	0.64			P
7440-43-9	Cadmium	14.6			P
7440-70-2	Calcium	1810		<del>P</del>	P
7440-47-3	Chromium	21.3			P
7440-48-4	Cobalt	22.8		<del>P</del>	P
7440-50-8	Copper	202		<del>P</del>	P
7439-89-6	Iron	49900		<del>P</del> JL	P
7439-92-1	Lead	16.0			P
7439-95-4	Magnesium	758		<del>P</del> JL	P
7439-96-5	Manganese	2210		<del>P</del> JL	P
7439-97-6	Mercury				NR
7440-02-0	Nickel	31.0			P
7440-09-7	Potassium	823			P
7782-49-2	Selenium	4.1	U		P
7440-22-4	Silver	0.55	J	<del>5Q N JL</del>	P
7440-23-5	Sodium	58.5	JQ		P
7440-28-0	Thallium	2.9	U		P
7440-62-2	Vanadium	69.2			P
7440-66-6	Zinc	1300		<del>P</del> JL	P
57-12-5	Cyanide				NR

Color Before: BROWN

Clarity Before: \_\_\_\_\_

Texture: MEDIUMColor After: YELLOW

Clarity After: \_\_\_\_\_

Artifacts: \_\_\_\_\_

Comments:

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## USEPA - CLP

1A-IN  
INORGANIC ANALYSIS DATA SHEET

EPA SAMPLE NO.

MJAAB8

Lab Name: CHEMTECH CONSULTING GROUP Contract: EPW06047Lab Code: CHEM Case No.: 37825 NRAS No.: \_\_\_\_\_ SDG No.: MJAAB6Matrix: (soil/water) SOIL Lab Sample ID: Z4666-10Level: (low/med) LOW Date Received: 09/24/2008% Solids: 74.5Concentration Units (ug/L or mg/kg dry weight): MG/KG

CAS No.	Analyte	Concentration	C	Q	M
7429-90-5	Aluminum	40600			P
7440-36-0	Antimony	8.1	U		P
7440-38-2	Arsenic	1.3	U		P
7440-39-3	Barium	369			P
7440-41-7	Beryllium	0.62	JQ		P
7440-43-9	Cadmium	2.3			P
7440-70-2	Calcium	17700		E	P
7440-47-3	Chromium	48.0			P
7440-48-4	Cobalt	22.8		E	P
7440-50-8	Copper	62.8		E	P
7439-89-6	Iron	39800		E JL	P
7439-92-1	Lead	3.4			P
7439-95-4	Magnesium	13700		E JL	P
7439-96-5	Manganese	874		E JL	P
7439-97-6	Mercury				NR
7440-02-0	Nickel	28.1			P
7440-09-7	Potassium	678			P
7782-49-2	Selenium	4.7	U		P
7440-22-4	Silver	0.17	J	JQ H JC	P
7440-23-5	Sodium	242	JQ		P
7440-28-0	Thallium	3.4	U		P
7440-62-2	Vanadium	97.7			P
7440-66-6	Zinc	41.1		E JL	P
57-12-5	Cyanide				NR

Color Before: BROWN

Clarity Before: \_\_\_\_\_

Texture: MEDIUMColor After: YELLOW

Clarity After: \_\_\_\_\_

Artifacts: \_\_\_\_\_

Comments:

## USEPA - CLP

1A-IN  
INORGANIC ANALYSIS DATA SHEET

EPA SAMPLE NO.

MJAAF7

Lab Name: CHEMTECH CONSULTING GROUP Contract: EPW06047Lab Code: CHEM Case No.: 37825 NRAS No.: \_\_\_\_\_ SDG No.: MJAAB6Matrix: (soil/water) SOILLab Sample ID: Z4666-13Level: (low/med) LOWDate Received: 09/24/2008% Solids: 42.9Concentration Units (ug/L or mg/kg dry weight): MG/KG

CAS No.	Analyte	Concentration	C	Q	M
7429-90-5	Aluminum	15400			P
7440-36-0	Antimony	14.0	U		P
7440-38-2	Arsenic	15.8			P
7440-39-3	Barium	161			P
7440-41-7	Beryllium	0.25	JQ		P
7440-43-9	Cadmium	1.4			P
7440-70-2	Calcium	4580		E	P
7440-47-3	Chromium	13.3			P
7440-48-4	Cobalt	10.1	JQ	E	P
7440-50-8	Copper	18.8		E	P
7439-89-6	Iron	23900		E JL	P
7439-92-1	Lead	6.5			P
7439-95-4	Magnesium	4380		E JL	P
7439-96-5	Manganese	1120		E JL	P
7439-97-6	Mercury				NR
7440-02-0	Nickel	8.5	JQ		P
7440-09-7	Potassium	555	JQ		P
7782-49-2	Selenium	1.3	JQ		P
7440-22-4	Silver	2.3	E	H U JL	P
7440-23-5	Sodium	200	JQ		P
7440-28-0	Thallium	5.8	U		P
7440-62-2	Vanadium	51.0			P
7440-66-6	Zinc	61.5		E JL	P
57-12-5	Cyanide				NR

Color Before: BROWN

Clarity Before: \_\_\_\_\_

Texture: MEDIUMColor After: YELLOW

Clarity After: \_\_\_\_\_

Artifacts: \_\_\_\_\_

Comments:

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## USEPA - CLP

IA-IN  
INORGANIC ANALYSIS DATA SHEET

EPA SAMPLE NO.

MJAAB6

Lab Name: CHEMTECH CONSULTING GROUP Contract: EPW06047Lab Code: CHEM Case No.: 37825 NRAS No.: \_\_\_\_\_ SDG No.: MJAAB6Matrix: (soil/water) SOIL Lab Sample ID: Z4666-12Level: (low/med) LOW Date Received: 09/24/2008% Solids: 45.4Concentration Units (ug/L or mg/kg dry weight): MG/KG

CAS No.	Analyte	Concentration	C	Q	M
7429-90-5	Aluminum	21100			P
7440-36-0	Antimony	13.2	U		P
7440-38-2	Arsenic	19.2			P
7440-39-3	Barium	167			P
7440-41-7	Beryllium	0.36	JQ		P
7440-43-9	Cadmium	1.7			P
7440-70-2	Calcium	4700		E	P
7440-47-3	Chromium	24.9			P
7440-48-4	Cobalt	15.2		E	P
7440-50-8	Copper	25.5		E	P
7439-89-6	Iron	33800		E JL	P
7439-92-1	Lead	7.2			P
7439-95-4	Magnesium	7870		E JL	P
7439-96-5	Manganese	687		E JL	P
7439-97-6	Mercury				NR
7440-02-0	Nickel	24.2			P
7440-09-7	Potassium	888	JQ		P
7782-49-2	Selenium	0.93	JQ		P
7440-22-4	Silver	2.2	U	N USL	P
7440-23-5	Sodium	220	JQ		P
7440-28-0	Thallium	5.5	U		P
7440-62-2	Vanadium	70.5			P
7440-66-6	Zinc	79.6		E JL	P
57-12-5	Cyanide				NR

Color Before: BROWN Clarity Before: \_\_\_\_\_ Texture: MEDIUMColor After: YELLOW Clarity After: \_\_\_\_\_ Artifacts: \_\_\_\_\_

Comments:

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20 OCT 08

10-15-08



## USEPA - CLP

9-IN  
METHOD DETECTION LIMITS (ANNUALLY)Lab Name CHEMTECH CONSULTING GROUP Contract: EPW06047Lab Code: CHEM Case No.: 37825 NRAS No.: \_\_\_\_\_ SDG No.: MJAAB6Instrument Type: P Instrument ID: P4 Date: 01/15/2008Preparation Method: HS1Concentration Units (ug/L or mg/kg): MG/KG

Analyte	Wavelength /Mass	CRQL	MDL
Aluminum	308.20	20	0.69
Antimony	206.80	6	0.41
Arsenic	193.70	1	0.37
Barium	493.40	20	0.090
Beryllium	234.80	0.5	0.010
Cadmium	226.50	0.5	0.040
Calcium	373.60	500	3.3
Chromium	267.70	1	0.080
Cobalt	228.60	5	0.080
Copper	224.70	2.5	0.10
Iron	259.80	10	0.20
Lead	220.30	1	0.25
Magnesium	279.00	500	5.3
Manganese	257.60	1.5	0.17
Mercury		0.1	
Nickel	231.60	4	0.14
Potassium	766.40	500	4.7
Selenium	196.00	3.5	0.35
Silver	328.00	1	0.090
Sodium	589.50	500	2.4
Thallium	190.80	2.5	0.56
Vanadium	292.40	5	0.12
Zinc	206.20	6	0.070
Cyanide		2.5	

Comments:

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## USEPA - CLP

9-IN  
METHOD DETECTION LIMITS (ANNUALLY)Lab Name: CHEMTECH CONSULTING GROUP Contract: EPW06047Lab Code: CHEM Case No.: 37825 NRAS No.: \_\_\_\_\_ SDG No.: MJAAB6Instrument Type: P Instrument ID: P4 Date: 01/15/2008Preparation Method: NP1Concentration Units (ug/L or mg/kg): UG/L

Analyte	Wavelength /Mass	CRQL	MDL
Aluminum	308.20	200	12.4
Antimony	206.80	60	2.3
Arsenic	193.70	10	4.1
Barium	493.40	200	2.6
Beryllium	234.80	5	0.20
Cadmium	226.50	5	0.40
Calcium	373.60	5000	106
Chromium	267.70	10	0.80
Cobalt	228.60	50	1.0
Copper	224.70	25	1.6
Iron	259.80	100	3.6
Lead	220.30	10	4.2
Magnesium	279.00	5000	31.2
Manganese	257.60	15	1.9
Mercury		0.2	
Nickel	231.60	40	2.9
Potassium	766.40	5000	35.9
Selenium	196.00	35	3.9
Silver	328.00	10	0.90
Sodium	589.50	5000	25.1
Thallium	190.80	25	2.2
Vanadium	292.40	50	0.60
Zinc	206.20	60	0.70
Cyanide		10	

Comments:

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12-IN  
PREPARATION LOG

Preparation Method: HS1

[illegible]